Editorial

A GREAT deal of publicity has been given of late to matters of air safety. An unfortunate succession of air crashes has, according to reports, resulted in a sharp decrease in air travel overseas. Such happenings are regrettable, and do much to undermine public confidence in flying. It is a mistake, however, to confuse the issue in our minds by jumping to the conclusion that because air accidents happen, flying is therefore unsafe. A bad crash in an aircraft usually results in loss of life because of the speed involved, and the fact that the aircraft frequently lands when forced to do so, in most inconvenient and sometimes dangerous localities.

Some criticism has been made of the DC3 type of aircraft which is now so well known as to be almost a household word. As the C47, it played a bigger part in military transport than did any other aircraft, particularly in New Guinea. If any aircraft could be considered fool-proof, it is the DC3. Yet many people at this stage have suggested that there is fundamentally something amiss in its design. Whereas actually there are so many of them flying now all over the world, that a given number of crashes must on averages involve a preponderance of DC3's.

The two main factors in air safety are probably maintainance and navigation aids. The former is merely a matter of good organisation, and strict observance of the maker's specifications covering load limits, etc. But any aircraft is liable to strike trouble when forced to fly under conditions where navigation is difficult, and where visibility makes landings and take-offs hazardous.

This is where radio aids will play such a big part in the future, particularly various types of radar, in addition to the services which are already operating. Unfortunately it is a fact that the closer the limits under which such devices must work, the greater is the risk if for some reason they fail to operate correctly.

At the moment, the main radio aids in Australia are the beam which guides aircraft over the major routes, and safeguards their general course, and the Lorenz beacon which is of great assistance in making a landing under conditions of poor visibility.

Radar devices can do much better than either of these systems, particularly in the most important matter of landings. It is possible for instance, to set an aircraft with an automatic pilot operating from ground equipment which will bring about a landing without any human factors at all. During the war, service aircraft used all manner of radio devices simply because operational urgency gave no choice but to send aircraft out, and on their return to land them.

But civil flying is a different matter. Any such devices must be absolutely foolproof, otherwise the extent of their accuracy might well be the extent of their danger. As limits are reduced, so is the margin of safety.

It is however, only a matter of time before radio aids which will earn the confidence of the pilots will become available to make flying even safer than it is today. This confidence is an absolute essential, because if the pilots will not use such aids, they are only so much excess weight. It is a case of complete co-operation in design, manufacture, installation and training, and not the least of these is training.

John Moyle

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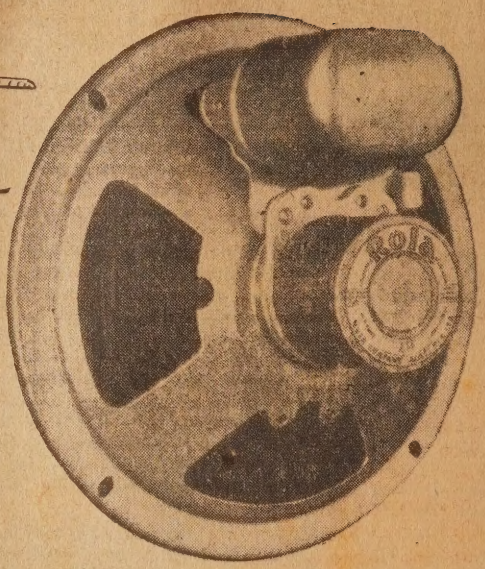
EDITOR: JOHN MOYLE, M.I.R.E. (VK2JU). TECHNICAL EDITOR: NEVILLE WILLIAMS, A.M.I.R.E. (VK2XU)

ROLA 8M



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Fitted with ROLA isocore (Type C) transformer, the ROLA 8M ensures against failure due to electrolysis in battery operated receivers.

Specifications:—

Weight (Speaker & Transformer) 2.87lbs.

Diameter of cone housing 8.1-16"

Distance front to back 3.61-64" (approx).

Voice Coil impedence 2 ohms.

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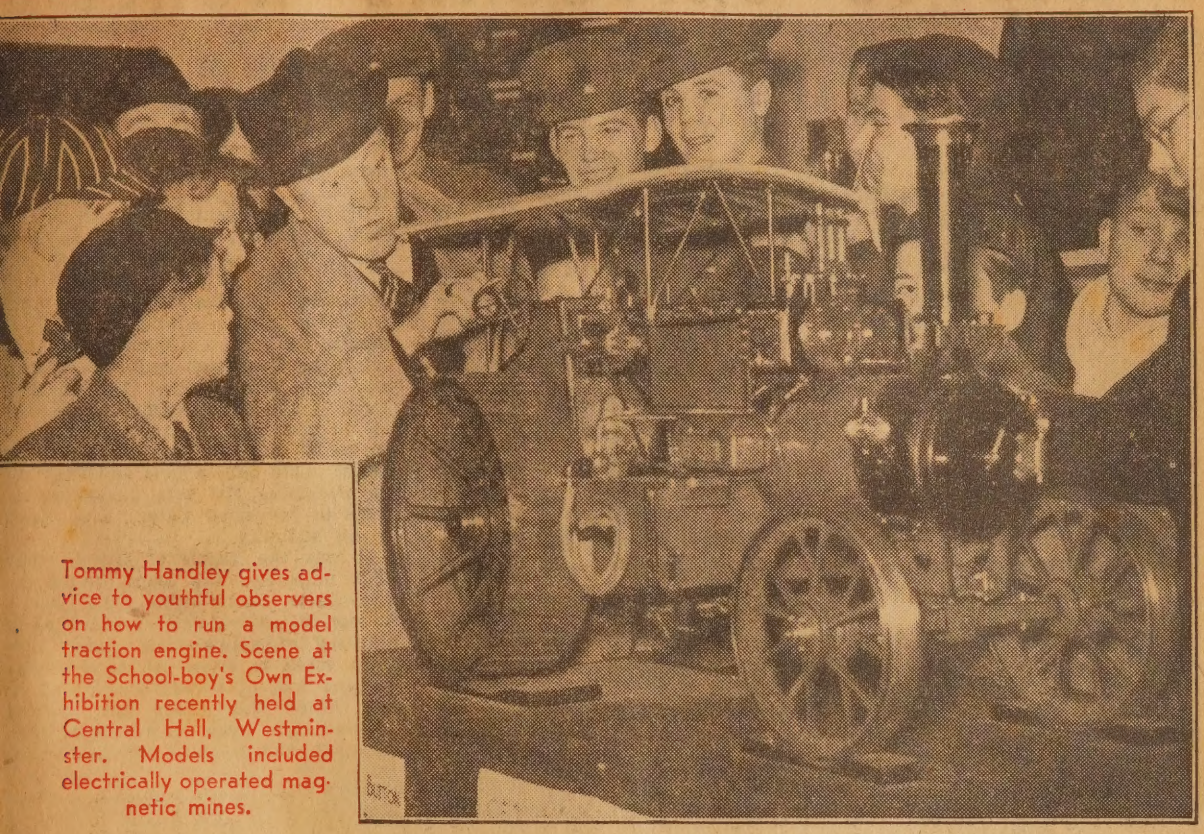
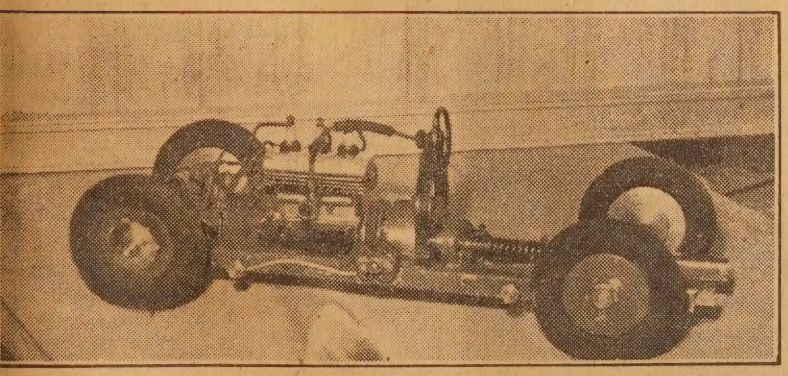
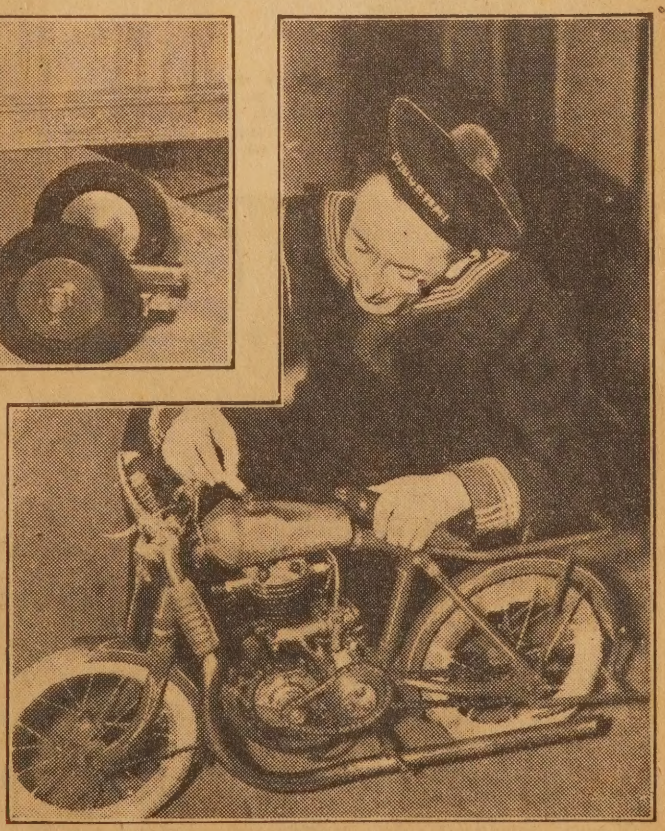
ENGLAND MAKES MODELS TOO!



Tommy Handley gives advice to youthful observers on how to run a model traction engine. Scene at the School-boy's Own Exhibition recently held at Central Hall, Westminster. Models included electrically operated magnetic mines.



Above—a miniature three cylinder two-stroke engine which drives the car at 100 mph was admired at the Third National Model Aircraft Exhibition in London.



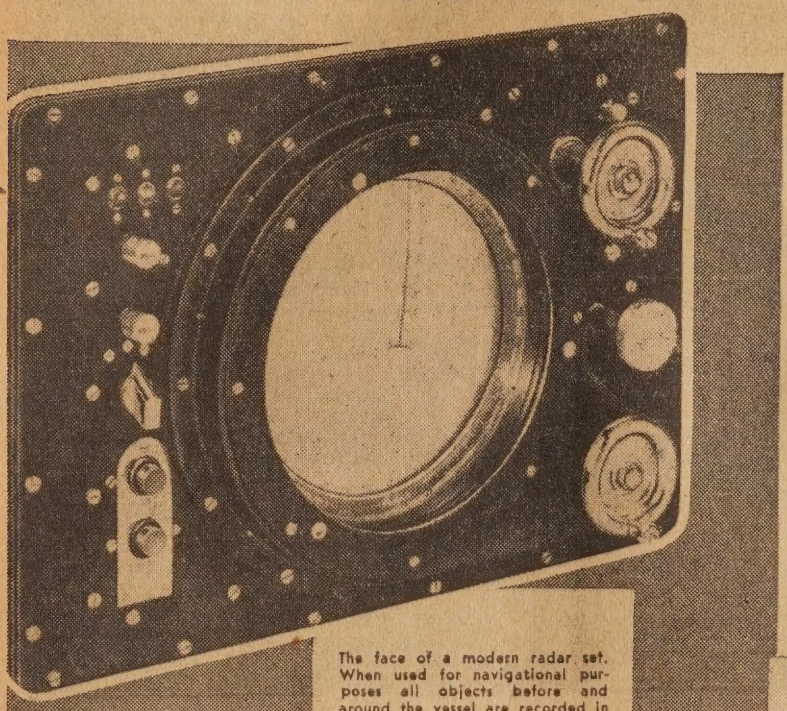
Right—Albert Brockway actually rides this model motorcycle in Mill's Circus at Olympia. It runs a mile on enough petrol for two lighters.

RADAR TO SAFEGUARD WORLD'S OCEAN JOURNEYS

"I HAVE subjected this apparatus to the most stringent tests and can say emphatically that it is the greatest boon the shipmaster has ever had. It is not too much to say that it means the end of fog collisions at sea."

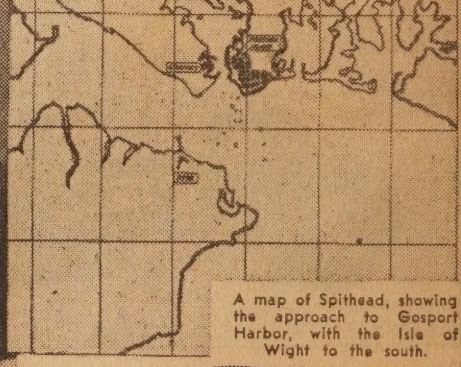
These statements were made by Captain Edward Griffiths of the 800-ton motor vessel "Atlantic Coast" after a test of experimental radar equipment on the tricky sea route from London to Liverpool, via Falmouth. As far as is known this was the first time that radar had been used on a coastal vessel. The weather conditions were appalling, which was all to the good as regards the experiment and it was proved that radar would offer a new and vital aid in promoting the safe navigation of ships in congested waters, even down to nil visibility.

It was the Battle of Britain that first impressed the word Radiolocation—later Radar—upon the world. It was the only means by which early warning of approaching enemy aircraft could be given. All early development was of necessity confined to the Allied war effort but it was realised right from the beginning that its application to peace-time use would



The face of a modern radar set. When used for navigational purposes all objects before and around the vessel are recorded in spots of light upon the screen.

A marine radar set installed in a ship's chart-room. In the very near future such equipment will be a standard fitting for all ocean-going vessels.



A map of Spithead, showing the approach to Gosport Harbor, with the Isle of Wight to the south.

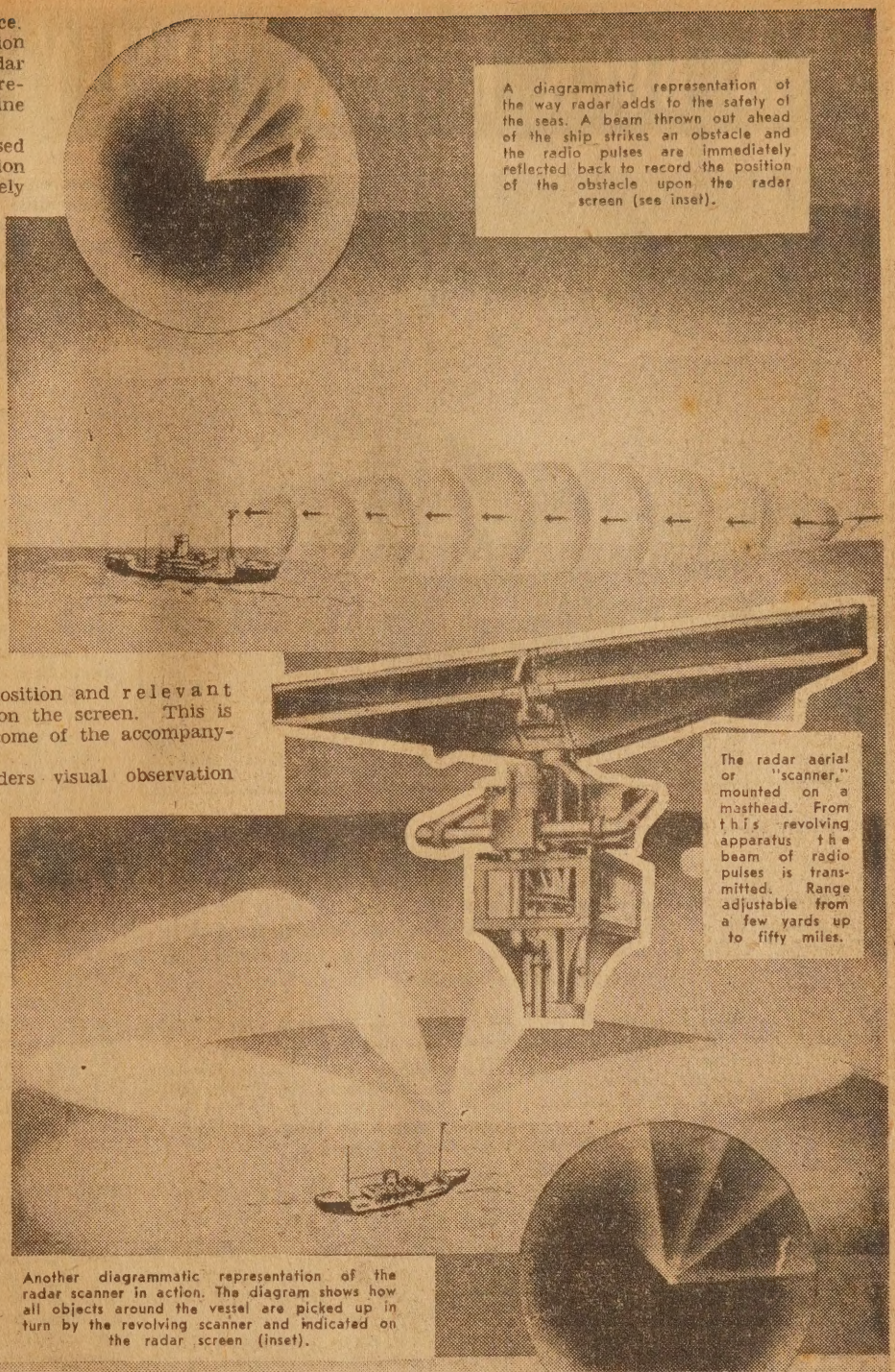
Approach to Gosport Harbor as seen on radar screen. Referring to the map above, notice how clearly the coast is indicated by the white lines—Ryde Pier being particularly prominent—and how the dots show the position of buoys and other ships.

be of even greater importance. The most obvious conclusion of all was that the radar principle would offer a revolutionary aid to marine navigation.

Radar navigation is based primarily on the propagation of radio pulses of extremely short wavelength and correspondingly high frequency from a specially designed aerial or "scanner" incorporating a parabolic reflector. The scanner is rotated continuously and thus the beam of radio pulses sweeps, like an invisible searchlight, all round the ship. On meeting any object within its path the beam is reflected back through the scanner and then passed on to a cathode - ray tube screen, similar to that used in television. Here an illuminated patch indicates the size, direction and range of the object in question — in other words, its precise position and relevant dimensions are shown upon the screen. This is admirably illustrated by some of the accompanying photographs.

When bad visibility renders visual observation impossible only radar can warn the navigator of uncharted dangers ahead. Instead of peering and groping blindly through fog and rain-squalls, or remaining helplessly fogbound, he has only to watch the radar screen in order to proceed confidently on his way, knowing full well that the radar "eye" will faithfully record all that it "sees."

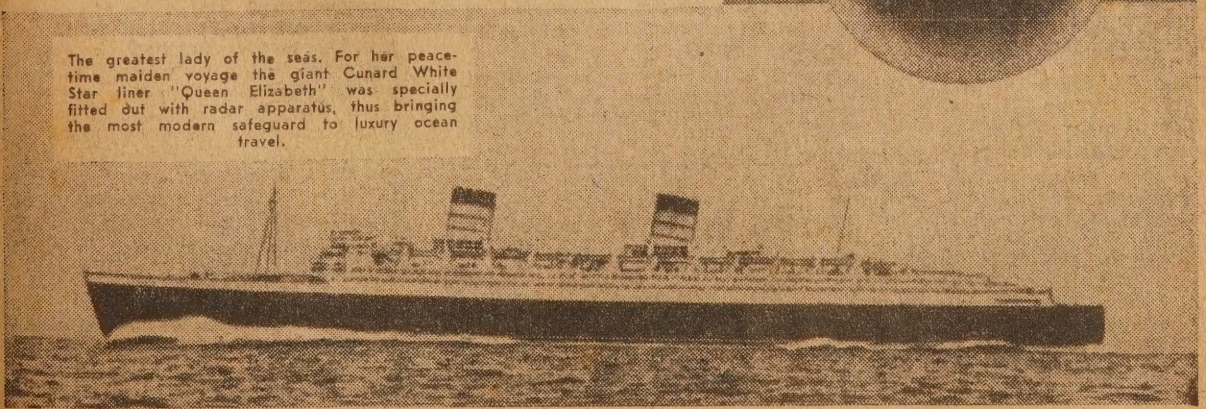
One of the first results of the successful demonstration of mercantile radar was the decision to equip the giant Cunard liner "Queen Elizabeth" with this new aid to navigation for her first post-war transatlantic voyage in October, 1946. It (Continued on page 75)



A diagrammatic representation of the way radar adds to the safety of the seas. A beam thrown out ahead of the ship strikes an obstacle and the radio pulses are immediately reflected back to record the position of the obstacle upon the radar screen (see inset).

The radar aerial or "scanner," mounted on a masthead. From this revolving apparatus the beam of radio pulses is transmitted. Range adjustable from a few yards up to fifty miles.

Another diagrammatic representation of the radar scanner in action. The diagram shows how all objects around the vessel are picked up in turn by the revolving scanner and indicated on the radar screen (inset).



The greatest lady of the seas. For her peace-time maiden voyage the giant Cunard White Star liner "Queen Elizabeth" was specially fitted out with radar apparatus, thus bringing the most modern safeguard to luxury ocean travel.

WAS BUCK ROGERS REALLY CRAZY?

This picture shows the beautiful streamlining and unusually slender wings used in this revolutionary aircraft.

We have been reading about speeds of thousands of miles an hour "just around the corner," "in the next decade," or "trips to London in 15 minutes" within our lifetime. Some of these theories have come from authoritative sources.

RECENTLY, Mr. Edward Helnemann, one of America's most prominent engineers conducting high speed aeroplane research for the United States Navy Bureau of Aeronautics, stated:

"Nothing aerodynamically can be considered impossible; however, we aren't able to add a thousand miles to the speed of aircraft as easily as Buck Rogers does it.

"The everyday working engineer is apprehensive that a public oversold by aviation romanticists may look upon reasonable and orderly advance in aeroplane speeds with disappointment, as a promise unfulfilled.

"The Wright brothers flew 28 miles an hour in 1903.

SPEED RECORD

"The British Meteor in September last year flew at 616 miles per hour. That's the fastest up till now. Figuring the annual increase in speed over this time span gives us a gain of only 14 miles faster every year. Never at any time has the level flight of the fastest aeroplane exceeded this rate of advancement. This applies to speed record flights only, and not to normal operations. It is well to keep in mind that regular aircraft usually fly about half as fast as the pace setters," concluded Mr. Heinemann.

Little did he know that at the time of his announcement the United States Army, now well established in aviation, is about to take another step toward air progress.

FLYING CAB

Sometime in the very near future, the AAF's first rocket propelled aircraft, the Bell XS-I, will make its first powered flight at Muroc Flight Test Base, California.

Designed to fly at a top speed of 1700 mph at an altitude of 80,000 feet, the XS-I was never intended to be a military aircraft.

It is actually a piloted flying research laboratory, the sole function of which will be the recording of the data on the effect of transonic and supersonic speeds on an aircraft.

This data will be used in the development of the faster and safer planes of tomorrow.

The product of a co-operative programme between the Army Air Forces, Bell Aircraft Corporation of Buffalo, NY, and the National Advisory Committee for Aeronautics, the XS-I has already flown—but not a supersonic and not under its own power.

It has been carried to altitude by a B-29 Superfortress bomber, released and allowed to glide to earth.

Described in the simplest terms, the XS-I is an extremely rugged airframe driven by a powerful rocket engine.

Surprisingly, for a plane designed to fly at speeds faster than man has ever flown before, the XS-I employs a rather conventional configuration.

Though streamlined, the use of the sweptback wing has been avoided.

The wing is very thin, with a maximum thickness of only 10 per cent. of the chord.

After initial test work has been completed, it is planned to try other wing designs incorporating the knowledge gained by experience with the test model.

POWER UNIT

Power for the XS-I is supplied by an engine designed and manufacttured by Reaction Motors, Inc.

This consists of four units, burning alcohol and liquid oxygen, each of which produces a static thrust of 1500 pounds, or a total thrust output for the plane of 6000 pounds.

Power output is controlled by selection of the number of cylinders to be fired at one time.

Thus, the pilot can use 1500, 3000, 4500 or full 6000 pounds thrust at his choice.

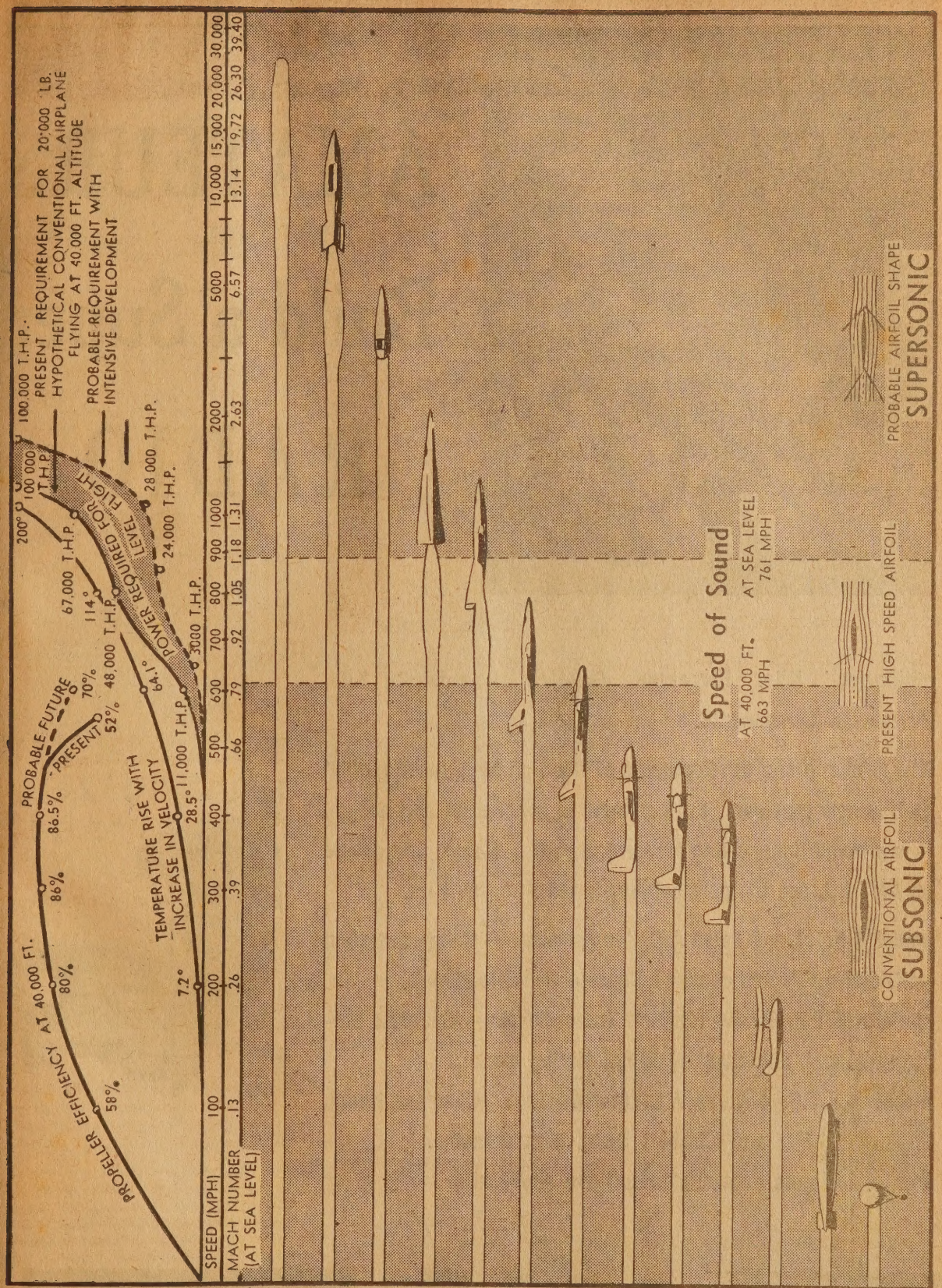
In the first model of the XS-I, the plane will not be capable of attaining the speed for which it was designed. This is due to the substitution of an alternate power plant. The original power plant installation was to have incorporated a fuel system wherein alcohol and oxygen would be forced into the burner chambers by a specially designed turbo pump. It soon became apparent, however, that the many problems which design of this turbo unit presented would delay its construction until considerably after the XS-I, in all other respects, would be ready for its first powered flight, and so the alternate was adopted.

PRESSURE SYSTEM

In the alternate design, a pressurised system is employed, with gaseous nitrogen being used to force the liquid oxygen and alcohol into the burners.

by

Boris Carone



As a consequence the XS-I fitted with the pressurised system can operate for only 2.5 minutes at full 6000 pounds thrust, compared to 4.2 minutes when equipped with turbo pump system.

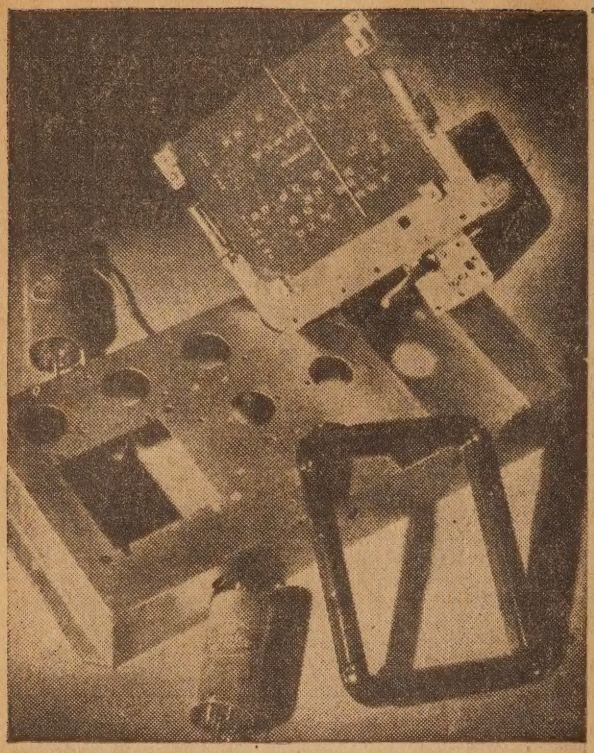
The overall weight of a fully loaded XS-1 will be 13,069 pounds.

Range will be extremely short, being little more than 100 miles.

Bell Aircraft's contract calls for demonstration of the following minimum performance requirements:

First, an 8 "g" pullout, at an indicated airspeed not exceeding 500 mph, or a stress of eight times the normal pull of gravity; an 8 "g" pullout at minimum speed; a proof to the specified endurance at rated thrust must respond

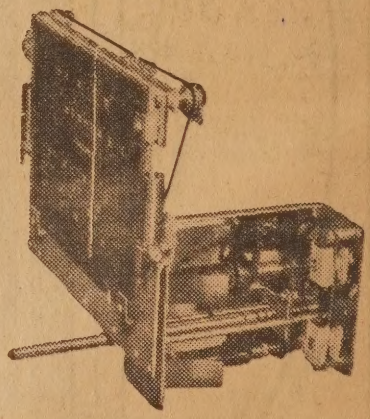
(Continued on Page 17)



AMATEURS Build a Super RADIO

"Kingsley" Kits. Ferrotune. Gangless Foundation Kits. Permaclad Components.

The research and developments of the war have been applied to this new receiver. Entirely new in conception and design, it is a revolutionary step forward in radio. Before you decide on ANY kit, see the permeability-tuned Kingsley Kits.



Model K.F.T.1. 5 valve A.C. (comprising:— Gangless tuning unit, dial, I.F.'s and chassis) Console or Table models.

Model K.F.T.2. 3 valve Reinartz (comprising:— Gangless tuning unit, dial, and chassis) Small Mantel model.

Model K.F.T.3. 4 valve A.C. (comprising:—Gangless tuning unit, dial, I.F.'s and chassis) Small Mantel model.

Mantel Cabinets available to suit the above kits.

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Technical Review

READING BOOKS BY SOUND

A new development from the RCA Laboratories may prove to be a boon to the blind. Although its praticability on a large scale has not yet been proved, the device makes it possible for the blind to read ordinary printed matter, obviating their dependence on Braille or talking books.

ESSENTIALLY, the device consists of a hand-held stylus which the user moves horizontally across a line of type, letter-by-letter. A beam of light directed through a narrow slit in the face of the stylus scans the print vertically, 30 times per second, indicating the presence and extent of black portions of each letter by a warbling tone which becomes audible through head phones.

Although the letters are scanned individually, tests have shown that a blind person, after practice, improves his reading speed by recognising the blended sounds of a complete word. Reading speeds in excess of 10 words a minute have been attained; the ultimate speed is believed to be in the neighborhood of 60 words a minute.

At the beginning of his instruction period, the blind subject requires some form of mechanical guide in order that the stylus should follow a line of type with some degree of exactness, but it is believed that a proficient reader will be able to dispense with the guide, since any deviation would be detected instantly by a change in the pitch of the tone.

AUSTRALIAN RADAR VALVES

AN article in a recent Radiotron booklet outlines the progress made in the local manufacture of vitally important radar valves.

Operating in conjunction with the Radiophysics Laboratory, a special section of the A.W. Valve Co., was established in 1942 to undertake developmen of the micro-wave centimetre radar valves, the manufacture of which was related closely to the radar equipment produced by AWA. The sequence of production of these special tubes was Klystron receiving valves, Magnetron transmitting and crystal (silicon) detectors.

Later, as a result of the development of a high power radar equipment by AWA, a new high power magnetron was put into production, in addition to a gas-filled T.R. switch valve.

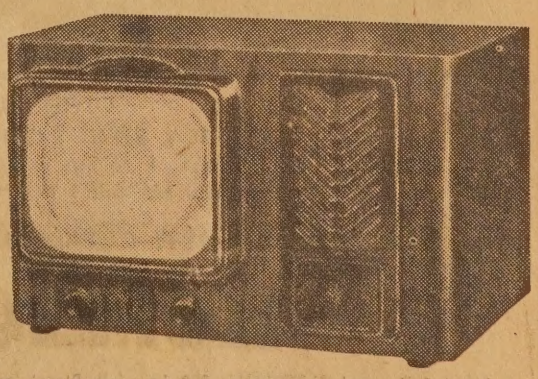
Later in 1943 and early 1944, a small centimetre production development was carried out, successful pilot models of magnetron valves were manufactured; this project also included an enclosed spark gap and another TR switch valve.

In 1944-45, a large centimetre project was started and the company was assigned the production of magnetron and TR switch valves. In the last phase of the war, large quantities of TR switch valves were made.

TELEVISION—TABLE MODEL

THE receivers now being developed for Britain's post-war television service will doubtless have a great influence on receiver design in this country—when such a service is inaugurated.

The trend towards simpler and less expensive receivers is illustrated by this "pye" table model television receiver, which is equipped with a 9-inch direct view tube. The sound channel covers television sound only and there are but two panel controls, picture brilliance and sound volume. The occasional controls—contrast, focus, line and frame holds—are behind a sliding panel under the speaker grille. The price in England is £35, plus £7/17/3 purchase tax.



WEATHER FORECASTING BY RADAR

Among the many uses of radar, one of the most valuable in peace time relates to weather forecasting and meteoroogy in general. This article from "Electronics" shows how the USA Army Corps is apply wartime radar to the problem.

FOR several decades the winds aloft have been measured by observing with a theodolite the motion of free balloons inflated with hydrogen or helium as shown in Fig. 1.

This method has always suffered from several serious limitations. It is possible to observe the course of a balloon to considerable heights, providing the weather conditions are favorable.

It is, however, more important to obtain meteorological information in bad weather, or threatened bad weather, than when conditions are fine and clear. But it is just these bad conditions which frequently make it impossible to observe the balloons' flight for any appreciable distance.

REFLECTOR TARGET

The pilot balloon or "pibal," if fitted with a reflector target as illustrated in Fig. 2, may be followed by means of radar to heights far in excess of those attainable by the best visual methods. The purpose of the reflector is to return strong "echoes" or radar reflections to the ground radar equipment in much the same manner as those normally returned from an aircraft target. By careful design, the reflector can be made highly efficient in this regard, no matter how it may swing or rotate while in the air.

The technique being used by the Americans is to use two equipments, one having a fairly wide beam width, by which the balloon can be kept always in "sight," supported by a much more accurate equipment operating on centimetre wavelengths. As early as 1943 equipment was available able to place the elevation, range and direction of the balloon quite as precisely as with former methods. Azimuth and elevation angles were correct to within .1 degree, direction to within approximately 1 degree, and range to within plus or minus 200 yards.

GABLE REFLECTOR

With the 11 cm. equipment for which the "gable" reflector illustrated was designed, 100,000 yards range has been obtained. The transmitter has been adapted for use with standard radiosonde equipment, which, attached to balloons, has been employed for some time to relay automatically air temperatures and humidity.

Another use of radar at present in the development stage relates to the detection and observation of storms. Microwave radar indicates clearly the location of rain or other moisture precipitations with great accuracy and resolution. Thunderstorm behavior can be forecast for 15 minutes to several hours by observing the signals received by P.P.I. type radars and comparing them with past observations. Rainstorms, &c., have been observed for some time by operators on such equipment, and even during the war such observations were valuable to air navigators.

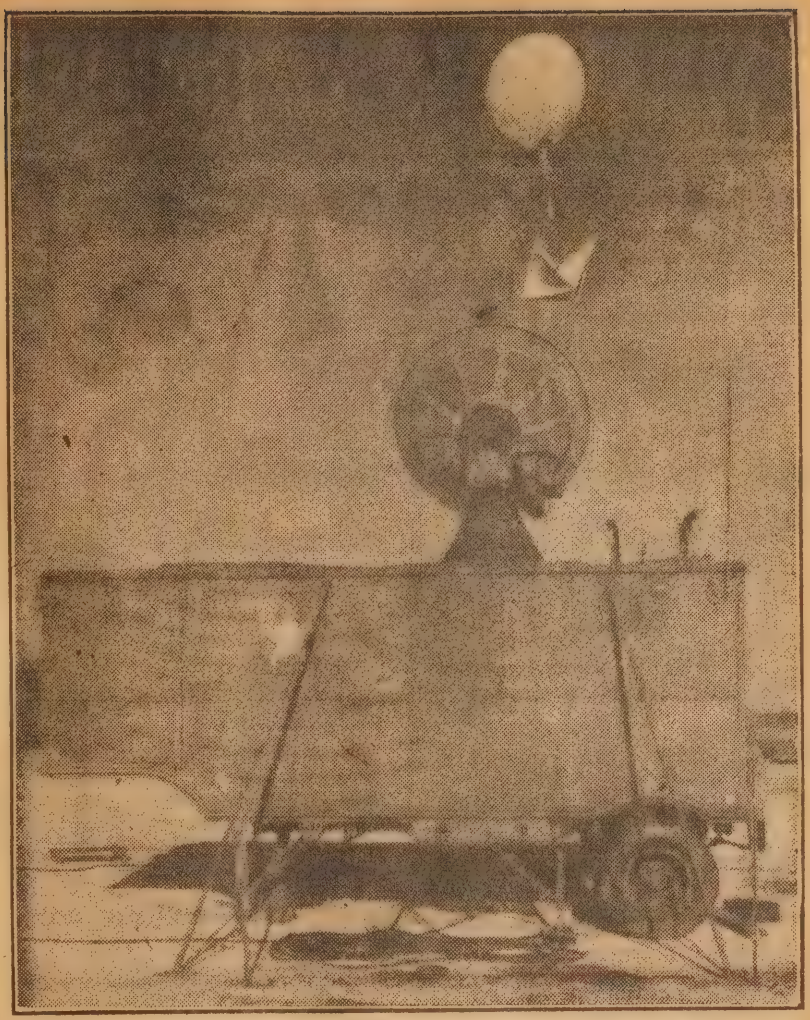


Figure 2.—Two operators and this 11-cm radar can track weather balloons through clouds and darkness to 100,000 yards range if the balloon carries a gable target such as that shown here.

Figure 1.—Conventional theodolite and weather balloon just before release.

RADAR ON THE QUEEN MARY

THE development of radar for commercial purposes is well in evidence in the reconditioned Queen Mary, now back on regular service after her long and valued wartime career.

The giant vessel is now able to navigate almost entirely by means of radar, even to the extent of docking when it arrives in port. Its latest radar equipment is reputed to have such excellent definition as to make visible in clear outline even the tugs which are moving it into position, to say nothing of the dock itself, and other ships which may be in the vicitity.

SCIENCE HAS EXPLORED THE UNIVERSE.

This old drawing shows the early chemist at work with his crude equipment—no gas, electricity or even good looks to help him!

Chemistry is the science that links us with the past, for ancient records show that man has always been interested in the materials which constitute the matter of the universe. How far he has progressed is made plain by compairing the old-time alchemist with the scientist of today.

IT is only in comparatively recent years that chemistry has been elevated to its place as an exact science based on accurate investigation, yet its beginnings can be traced back to earliest times.

Chemistry was applied when man lit the first fire, for by means of heat accidentally applied to natural substances changes were brought about which finally led to processes used at the present time.

It is generally believed that the discovery of glass was made when a fire was lit on sand. The heat fused the sand into a glasslike mass which was used for spear heads and cutting instruments.

THE ANCIENTS

The ancient Greeks, Romans, Egyptians and Phoenicians are known to have had some knowledge of metals and other common substances. But it is not known whether they knew much of chemistry as a science, as no such records have been left by them. It is probable that their knowledge was limited to accidental discoveries.

Among the metals used by the ancients were gold and silver, iron, copper, tin, lead, mercury and brass. The latter was not, of course, known as an alloy of copper and zinc, the mixture being merely a hit or miss process. Methods were known of extracting metals from their ores.

ARABIANS CLEVER

The manufacture of soap, glass, leather, stoneware, &c., was a very early contribution to chemistry, and the manufacture of vinegar and beer by fermentation constituted a no doubt valuable addition to chemical knowledge.

The ancient Arabians were not backward in their knowledge of the preparation of medicines by chemical methods, and as their methods were not favored by a surer knowledge than "try and see" their cemeteries were possibly kept well supplied with victims of their mistakes.

In the eighth centry AD there lived an Arabian chemist named Geber. He was quite a brainy fellow and wrote a few things down for posterity. His writings showed that he knew how to distil vinegar although he mentions nothing about moonshine or "mountain dew." He knew how to make sulphuric acid, which was a useful piece of information in view of the fact that the throwing of this unpleasant liquid at one's enemies or rivals in love was a favorite pastime in those days.

White arsenic was known to Geber. There was a good demand for this for introduction into the wine of one's political or royal rival. Borax, alum, salt, sal ammoniac, sulphate of iron and mercuric chloride were among Geber's chemical achievements.

During the period from Geber's time to the 18th century the apparatus used was almost unchanged, and little progress was made except that which marked the period of the alchemists. These worthy gentlemen were somewhat akin to witch doctors and their efforts were not directed towards the discovering of the chemical properties of substances but were actuated by the profit motive in trying to turn baser metals into gold or endeavoring to make people live for ever.

ALCHEMY

Now, turning the baser metals into gold may be a fairly worthy cause. Many people would be happy to hold the secret, and I for one would be pleased to invest in any business which has such an objective based on infallible methods. Living for ever also has its attraction, providing this scheme could be worked in conjunction with the former.

Egypt seems to have been the birthplace of alchemy just as it has been the birthplace of many other mystic doings. From Egypt it spread to Arabia and Persia, and the aforementioned Geber wrote a book called the "Summit of Perfection," which turned out to be the oldest book on chemistry in the world. There is a lot of rubbish in the book, but also a lot of good information on the dark doings of these masters of "hooey."

This book shows that the Arabians had been boiling, calcining, melting, precipitating, coagulating and dissolving for quite a long time. They called themselves polypharmacists and used as their base chemicals mercury and arsenic, sulphur, gold and acids.

MERCURY AND SULPHUR

Mercury and sulphur fascinated the alchemists quite a bit, for they had seen the remarkable penetrating properties of these elements.

Gold was considered the most incorruptible of all substances, owing, of course, to the great difficulty in dissolving it by means of any chemicals known at that time. Great was the admiration of the alchemists, therefore, when they saw mercury absorb gold as water dissolves sugar.

FROM ALCHEMY TO ATOM SMASHES

by Calvin Walters

They saw hot iron melted by the application of a stick of sulphur, forming a new substance having none of the properties of either iron or sulphur. It was excusable therefore for them to believe that all metals were made up of mercury and sulphur in varying proportions, and so they toiled with their crucibles, pestles, and mortars, furnaces, stills, and their concoctions, fixations, sublimations, filtrations and so on, hoping that some day one of them would get in first and turn a mixture of mercury and sulphur into a nice big yellow lump of gold.

SUPER-PERFECT SUBSTANCE

Alchemy spread to Europe, and during the Middle Ages it was mainly the monks who whiled away their idle hours in the practice of the "art." The idea back of the scheme of alchemy seems to have been somewhat of the following. Gold was the most perfect metal, and all other metals were inferior to gold because of some accident such as arrestment or corruption. It could not make imperfect metals perfect when mixed with them, but would itself become imperfect, so that doing this would be a waste of good gold. But if one had a substance which was many many times more perfect than gold, it would perfect the imperfect metals and produce the perfect metal, gold.

It was reckoned that such a superperfect substance would be a mixture of the purest mercury and sulphur, sublimed into a solid mass by incantations, sacred fire, and other mystic rites, known today by the all-embracing term of "bolony." This superperfect substance was the eagerly sought, but never found, "philosopher's stone."

It was thought by some alchemists that the "Elixir of Life" was gold dissolved in a mixture of nitric and hydrochloric acid. We have no records of anyone being tempted to drink the mixture, except what exists in legend, and, as one might expect, legend has it that some wonderful things happened to those who partook of it. No one has come forward to throw any light on the matter, which surely would happen if any of the subjects had shown any signs of living forever. If any of them read this article, I would be glad if they will call on me and tell me all about it. They can get my address from the Editor.

OUR DEBT TO PAST

Now, it must not be assumed that the alchemists taught us nothing. They discovered quite a lot, although they didn't know it, as they were interested in finding only one or two things which they didn't find. The new substances found by these men were handed down, and it is to them that we owe our knowledge of many potent chemicals. They started something they couldn't stop, and at last, in the period 1627-91, Robert Boyle tried to put chemistry on a more scientific basis. He was an investigator and experimenter along more expansive lines, and was responsible for the law concerning the relation of the volume of gas to pressure in gases.

Then came Becher and Stahl, between 1660 and 1734. Stahl invented the Phlogiston theory of combustion, which held that phlogiston was a constituent of all combustible substances, and when a substance burned the phlogiston made its escape. What was left was the other substance with which the phlogiston was mixed. This theory was popular for about 50 years.

In 1772-85 the French chemist Lavoisier finally exploded the phlogiston theory when he discovered oxygen. He proved that combustion was the union of a substance with oxygen. He introduced some system into chemical research and discovered the components of many substances.

QUANTITATIVE ANALYSIS

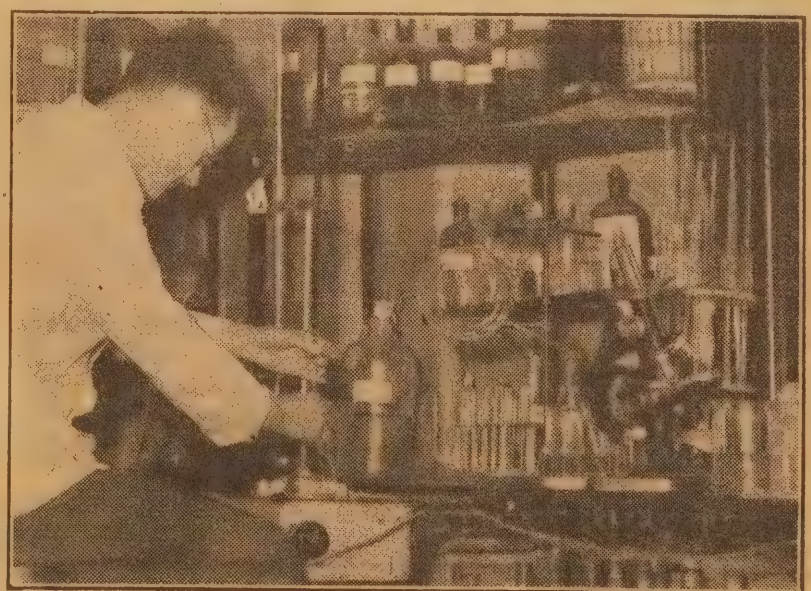
Then, towards the end of the 18th century, quantitative analysis of substances began to be recognised. We find from that date a constant acceleration in chemical research, and in that period Dalton expounded his atomic theory, which held that all matter is made up of atoms in varying proportions.

Now, if the alchemists had known of the atomic theory, they may have accomplished something, because it is on the atomic theory that all present-day chemistry is based. What the alchemists failed to do is being done today in every laboratory in the world. It is not now called alchemy—it is called synthesis, and is applied, not to the manufacture of gold (this would be too great a shock to our economic system, which assumes that gold will always be valuable), or the elixir of life, but to the manufacture of hundreds of new substances from the other substances.

ATOMIC THEORIES

The old atomic theory held that the atoms of substances were held together in the substance by a kind of chemical affinity, and that these chemicals and compounds were unchangeable, because the atoms could not be added to or taken away.

This idea received a bit of a jolt some years after two chemists, Wohler and Liebig, started experimenting with alcohol. Many people have experimented with alcohol and have discovered only that—well, you know. But these two chemists mixed some silver nitrate with alcohol and nearly blew themselves up in the process, for this mixture makes silver fulminate, a



The modern chemist can call on vast resources for his work. Gas and electric power, microscopes, and an endless array of electronic apparatus is at his service.

The Palec "MAJOR" MULTIMETER

A high-grade multi-purpose testing instrument for both A.C. and D.C. measurements, providing all the necessary ranges for Electrical and Radio testing.

The "Major" is mounted on an attractive moulded panel, beneath which the movement is *totally enclosed*. The instrument has a 5-inch scale fitted with an anti-parallax mirror. Range switches, multipliers, current transformer, etc., are mounted on a readily detachable chassis. Batteries, resistors, shunts and current transformer are completely self-contained. Precision wire-wound resistors and shunts of negligible temperature co-efficient are used on all current ranges, and voltage ranges up to and including 500 volts.

Housed in a metal case with wooden carrying case.
Overall size, 9½ x 7¾ x 5½ inches; weight, 11¾ lbs.

ACCURACY: 1st Grade B.S.S. 89—1937.

CERTIFIED TEST REPORT supplied.

D.C. RANGES

Current: 0-10 Amp., 0-1 Amp., 0-250 mA., 0-50 mA., 0-10 mA., 0-1 mA.
Voltage: 0-1,000 V., 0-500 V., 0-250 V., 0-50 V., 0-10 V., 0-100 mV.
Resistance: 0-1,000 Ohms, 0-100,000 Ohms, 0-1,000,000 Ohms.
(No external battery required.)

A.C. RANGES

Current: 0-10 Amp., 0-1 Amp.
Voltage: 0-1,000 V., 0-500 V., 0-250 V., 0-50 V., 0-10 V.
Decibels: —10/ 0/ + 14 dB., + 4/ + 28 dB., + 18/ + 42 dB.
0 dB. = 6 mW. in 600 Ohms.

TRADE PRICE: £25/15/- PLUS TAX.

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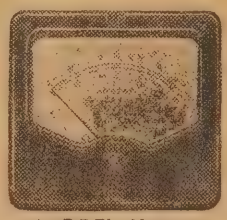
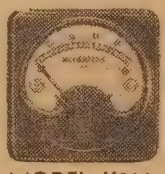
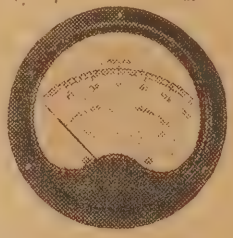
Moving Coil and Moving Iron Types.



MODEL K400
Square only.



MODEL K216
Square and round.



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MODEL K35
Square and round.

MODEL K150
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6.6

powerful explosive which explodes at a touch.

The two enthusiasts found that the new substance had exactly the same formula as silver cyanate when the formula was expressed in the terms of the old atomic theory, but each chemical had altogether different properties. Something was astray somewhere. Rechecking did not bring to light any fault in the working out of the formula.

There was only one thing for it. Something must be wrong with the atomic theory. The compounds contained the proportion of elements as stated in the formula all right, but there must be something else required.

ATOM ARRANGEMENT

Later it was discovered by others that the something else was the way in which the atoms were arranged in the molecule of the substance. In addition to being in certain definite proportions and quantities the atoms must be arranged according to a certain design within the molecule so as to form a special carbon substance.

Substances have been likened to a jig-saw picture puzzle. Within the substances are molecules consisting of various atoms arranged in a particular fashion. Chemists have found just where these atoms must fit to make the complete substance and also that the pieces can be taken away or changed around and so make a different picture or substance.

In every substance there are certain sets of atoms which stick together in a single piece. In carbon compounds in particular this is the case. These units are called "radicals." Chemists found that these could be interchanged with single atoms until finally the formula could be worked out on paper, the atoms and radicals rearranged and the formula for a new substance obtained showing just which atoms must be rearranged and what atoms must be added or taken away.

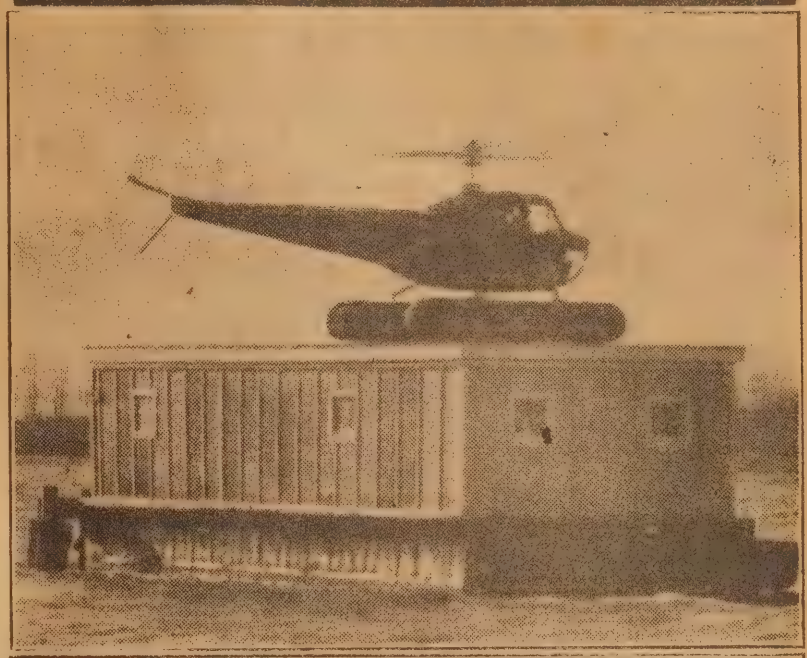
APPLICATIONS

The next step was to apply this knowledge from the formula and do the actual arranging in the laboratory. The processes involved are too complicated to describe here, but it is sufficient to say that hundreds of new substances which were formally only made by natural methods were manufactured in the laboratory. We now have artificial perfumes, dyes, medicines, rubber, silk, sugar, alcohol and food from coal and other substances. Chemists can now make gear wheels from soya beans and motor car parts from milk. By splitting apart the molecules and atoms of crude petroleum we can have high-grade petrol. There appears no limit to the manufacture of new substances merely by the rearrangement of the atoms in the molecules of other substances.

The amazing part of all this is that this rearrangement can first be done on paper, thus giving a definite formula for the chemist to follow.

The manufacture of sulpha drugs and aspirin are examples of synthesis. Dyes and flavors and perfumes are made from coal tar. Salicylic acid—a constituent of aspirin — when mixed with alcohol in the right way produces oil of wintergreen, used as flavoring of confectionery.

HELICOPTER LANDS ON WATER



This shot from a Movietone Newsreel shows a helicopter on floats landing at Niagara Falls N.Y. This is the first successful trial of pontoons on the water, and promises to be a great success in floods, etc. The upper picture shows the helicopter landing on a house-boat.

CYCLOTRONS

In the cyclotrons, those atom smashing machines which paved the way for the atom bomb, new radioactive substances are formed by the impact of other atoms. Metals and chemicals introduced into the path of the atomic bullets ejected from the cyclotron assume different characteristics. They become radioactive and thus become useful as medicines. Radium is no longer the only useful radioactive substance in the treatment of disease. We now have radioactive iron and phosphorus for the treatment of blood and bone diseases. Radioactive sodium, calcium, copper, and so on, each being useful for treatment of diseases where deficiencies of these metals and salts are a contributing cause. Iron has been changed to cobalt, and so we go on and on without end to the possibilities ahead.

HOW IT WORKS — CARBURETTOR

An essential mechanism in the internal combustion engine using a liquid fuel, the carburettor prepares the fuel for use in the combustion chambers of the motor by breaking it up into very small particles and mixing it with air.

PETROL is drawn from the main supply tank either through an auxiliary tank placed high in the engine section (a vacuum tank from which the petrol gravitates to the carburettor), or by a direct pump, operated either mechanically or electrically.

The carburettor, which is illustrated here in operation, is a device by which a spray of petrol is sucked through a minute needle hole by the suction of the engine piston on the induction stroke. The fine jet of fuel mingles with an incoming current of air and produces a mixture of vapor usually in the proportion of one of petrol to 15 of air. The supply of petrol to the needle hole is automatically regulated by the float, which rises with the petrol in the float chamber. It is so arranged that the float raises a needle valve to cut off the supply when the chamber is full. When the petrol level falls the float goes down, allowing the needle valve to open and refill the chamber.

GENERAL PRINCIPLES

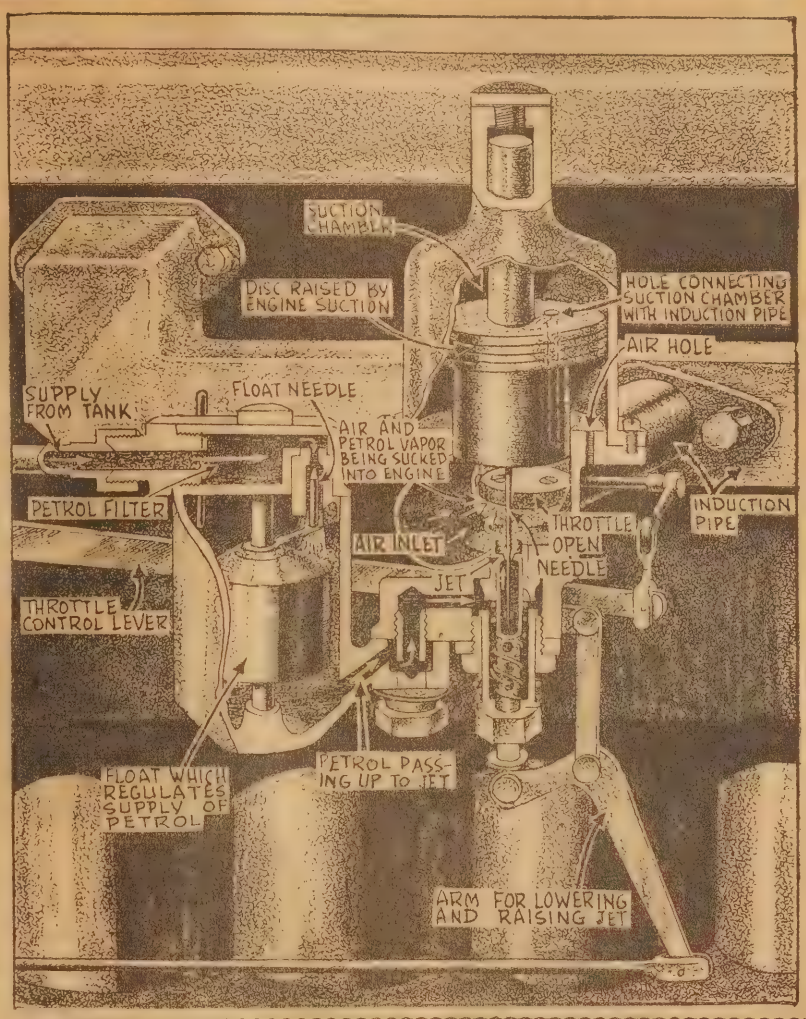
The essential requirement of a carburettor is that it must provide a high degree of atomisation of the fuel. The principles of carburettor design are highly technical, for the mechanism must give a larger proportion of petrol than air for starting up, a suitably rich mixture for idle slow running, and a less rich mixture—but one of great volume—for high-speed running.

Following in detail the operation of the "spray" type of carburettor shown here, petrol enters the float chamber from the supply pipe under the control of the needle valve. It passes to the space around the jet, finding its way into the tube through holes in the wall. The jet is controlled by a needle attached to a piston.

When engine suction is increased by opening the throttle of the motor the suction operates above the piston, which is drawn up, opening the jet further.

Air being drawn in rapidly through the air inlet passes over the jet opening and mixes with the petrol, which is thus vaporised. The globules of petrol mixed with air form a highly explosive mixture which passes to the engine.

So that the mixture can be enriched for starting a cold engine, which needs more petrol than air, the whole jet can be lowered by means of the driver's "choke" lever.



WAS BUCK ROGERS REALLY CRAZY?

(Continued from Page 7)

satisfactorily to controls at a speed of Mach number .8.

(The Mach number, named after German scientist Ernst Mach, who devised the system, is used in designating speeds relative to the speed of sound.

The speed of sound is not constant.

It decreases with altitude and temperature from 763 mph at sea level to about 660 mph at 40,000 feet, since sound travels slower in cold than in warm air.

Consequently, in order to indicate velocity in its proportion to the sound at an altitude, the Mach number is employed.

A Mach number would be 80 per cent of the speed of sound at any altitude.

An instrument known as a Machometer, which automatically compensates for altitude and temperature, is employed for Mach reading.)

During the early test phase of the programme the XS-1 will be checked comprehensively by the National Advisory Committee for Aeronautics by an oscillograph, an instrument to determine the strains sustained by structural members of the tail and wing.

The wings have an aluminium alloy skin, machined out of solid stock so as to permit a thickness at the butt of more than a half-inch, while it tapers off to only slightly more than 1-8in at the tips.

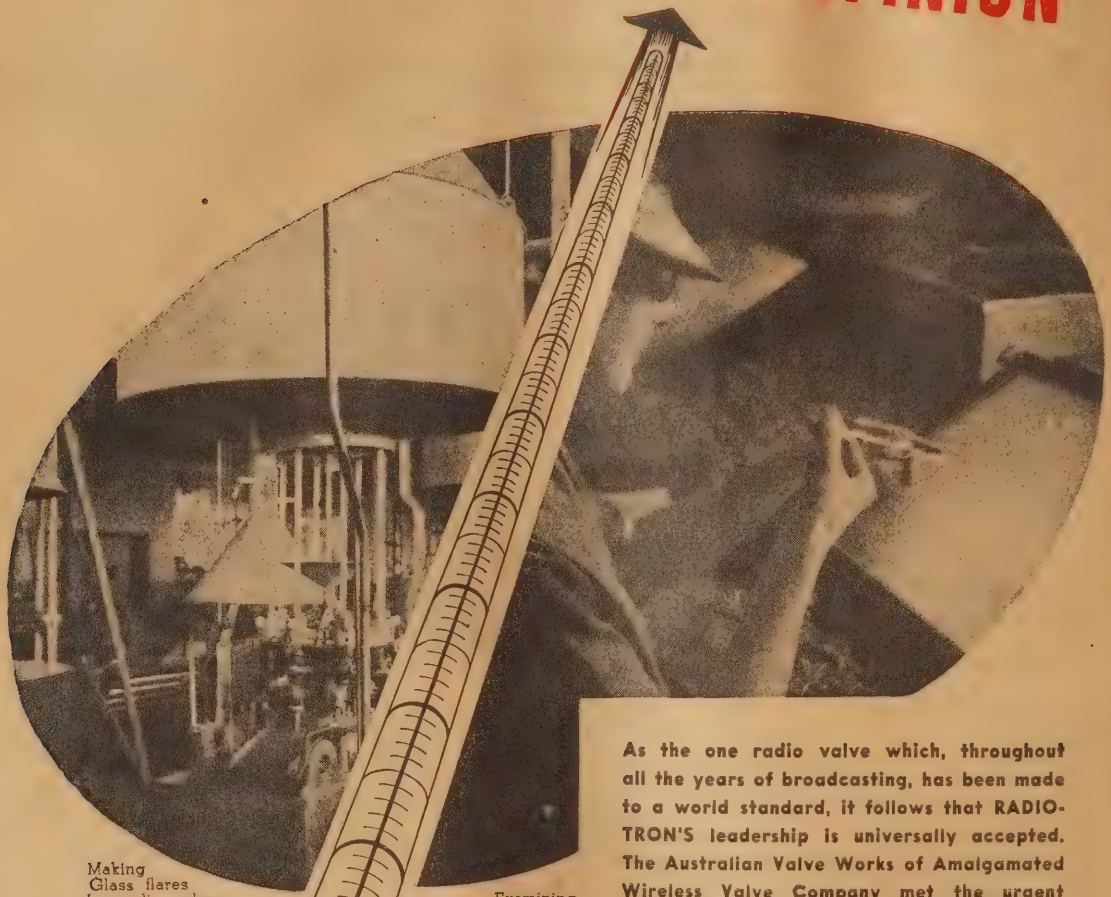
Overall the plane is designed to stand a force of 18 times the pull of gravity, thus presenting the most sturdy aeroplane ever built.

Then Buck Rogers isn't so crazy after all.

Only we ask Buck to take it a bit easy with his 100,000 miles an hour.

After all, a meteor falling into the earth's atmosphere burns itself up after 25,000 miles an hour—thank goodness.

THE BAROMETER OF WORLD OPINION



Making Glass flares for radio valves . . . .

. . . . Examining flares over an illuminated screen.

As the one radio valve which, throughout all the years of broadcasting, has been made to a world standard, it follows that RADIOTRON'S leadership is universally accepted. The Australian Valve Works of Amalgamated Wireless Valve Company met the urgent needs and uncompromising standards of defence throughout the war — the same organisation, to-day, is increasingly competent to provide the growing needs of peace.

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V2

NEWS AND VIEWS OF THE MONTH

Radar And Weather

OF great interest is the news that special naval radar equipment developed during the war is to be installed in Australia for meteorological purposes. It will assist in checking weather conditions, storm developments, &c., all of which information is of great value, particularly for aviation.

The equipment is being supplied from England at a cost of £15,000, half its original price. It cannot be installed for many months, however, owing to difficulties of supply and staff training. Ten weather balloon stations have already been established here, five more are to be built, and also one in the Solomons.

Australia is geographically an important link in a network of points which together study the world's weather and radio propagation conditions, both of which are becoming increasingly important with the advance of modern communications and travel.

★ ★ ★

Life On Mars?

AMERICAN astronomers recently photographed the spectrum of the sun, according to the Astronomer Royal, Sir Harold Spencer-Jones, who is now in Australia.

Sir Harold, who is a director of Greenwich Observatory, said that the photography was done with a spectograph, mounted in the warhead of a controlled rocket.

The rocket had ascended to a maximum height of 112 miles, taking exposures at regular intervals.

Sir Harold said that rockets gave astronomers a great chance to discover some of the great secrets of the universe, as they could get above the earth's atmosphere and photograph Mars and other planets.

He said that astronomers already were definite that there was some form of seasonal vegetation on Mars.

It is also known that much of the great planet was a "red desert." It had been established that mankind could not exist on Mars, but it was quite possible that some other form of intelligent life did exist there.

Sir Harold has come to Australia to discuss the development of astronomical work in this country.

★ ★ ★

Amateur Operating

THE standard of operation shown by many phone stations, particularly on the 7mc. amateur band is badly in need of improvement. We hope the day will never come where amateur conversation is formal or devoid of humor, but many examples noted recently come very close to larrikinism. Unfortunately, some offenders are old-timers who should have learned the importance of setting an example. Some of these QSO parties, using VFO's to break through another man's transmission, apart from being flagrant breaches of PMG regulations, have been noted in the worst possible taste.

Every time you go on the air, why not give a thought that plenty of people will be listening to what you say. Use a little judgment and restraint when you are speaking on the air. Otherwise the day will come where action will be required to keep the standard of operating where it ought to be.

★ ★ ★

Secrets of Edison

CHARLES EDISON, son of the inventor Thomas Edison, recently found a test tube containing uranium nitrate in his father's roll-top desk.

Uranium is a substance vital in the production of atomic energy.

The desk had been sealed since Thomas Edison's death on October 18, 1931.

No one knows what experiments Edison conducted with uranium before his death, but scientists hope to get a clue from a sheaf of papers also found in the desk.

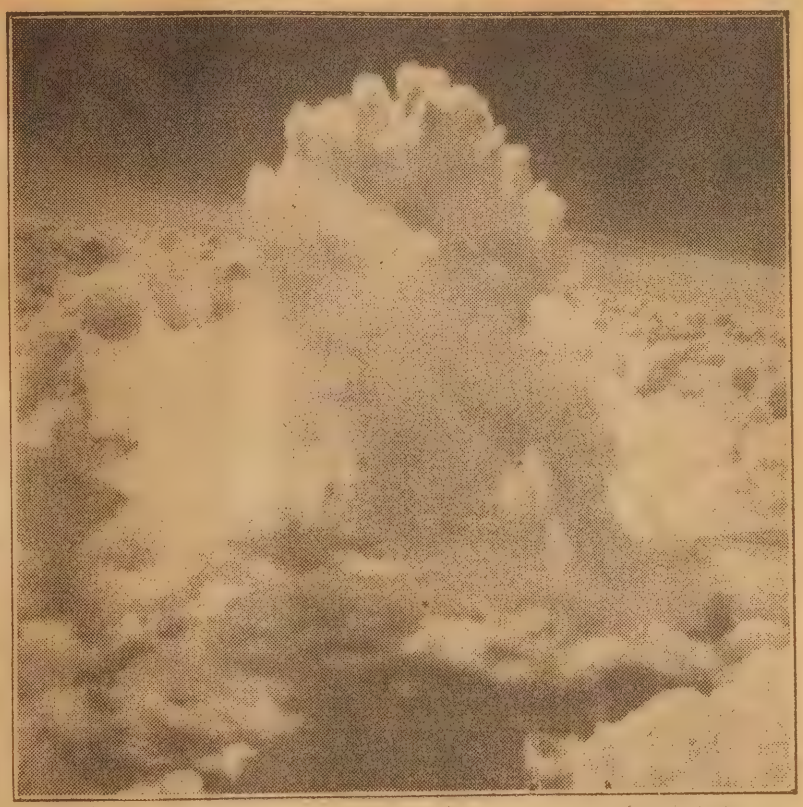
Charles Edison opened the desk as part of a week's observance of the 100th anniversary of his father's birth on February 11, 1847.

Two American spiritualists claimed recently that Edison, in a message from "the other world" had told them he had left a momentous message to the world in his desk.

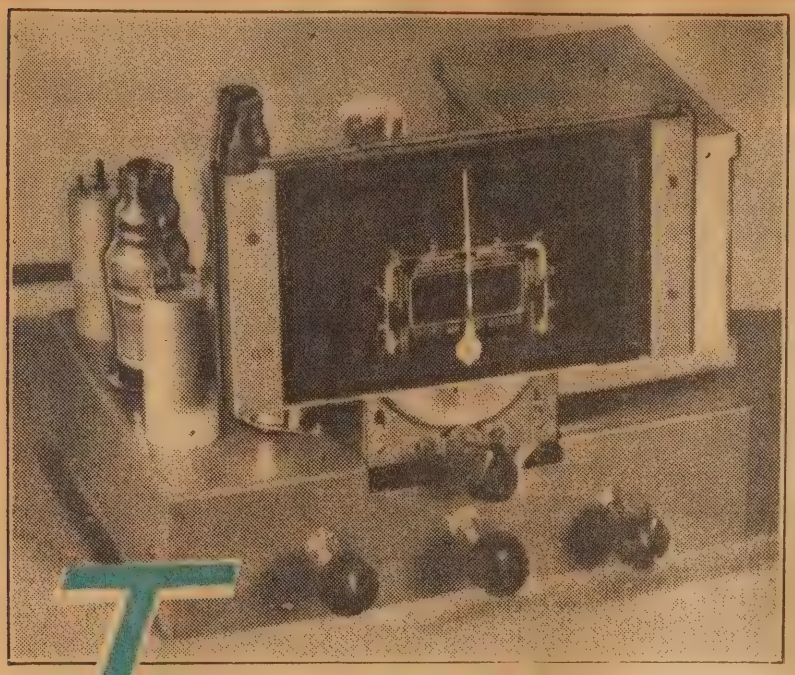
They said he had hidden the message in the screw top of his fountain pen.

Charles Edison found two fountain pens in his father's desk, but neither held any message.

The desk also contained a roll of chewing tobacco, stomach pills, mouth wash, old bills, and jokes in Edison's handwriting.



Recently we published a number of pictures of the atom-bomb explosions at Bikini. They showed amazing "cloud" formations of a type and magnitude never seen before. The above photograph is also of a man-made cloud, and of the two, it may foreshadow the greater ultimate benefit to mankind. It is a cloud which resulted when a quantity of "dry ice" was dropped from an aircraft in the vicinity of the Blue Mountains by scientists of the C.S.I.R. A shower of rain followed the cloud formation which it is estimated grew 7000ft. in height in the process. While it may never be possible to manufacture a shower of rain from a clear blue sky, experiments indicate quite definitely that advantage may be taken of favorable atmospheric conditions to precipitate rain from moisture-laden atmosphere, particularly where suitable cloud formations already exist. The modern "rain-maker" may yet be a key man in the prosperity of rural areas. He may even hold out new hope in the battle against drought and its destruction.



The vibrator power unit is mounted on the rear of the chassis in a metal box suspended on rubber grommets or bushes. Otherwise the set looks very much like a standard battery job.

THE VIBRA-FOUR

Certain to be popular, this receiver is just about the simplest vibrator set one can construct. It follows similar lines to those of the Vibra-Five, and is really its smaller brother.

by W. N. Williams

INTRODUCING the Vibra-Five a couple of months ago, we mentioned it as being just about the ideal set for the average country listener Description of a four valve set does not in any way represent a change in our views. In the general scheme of things, there is an obvious place for both larger and smaller sets We like a set with an R.F. stage simply because we know, from experience, that it will generally tune any signal worth listening to above the prevailing noise level.

GENERAL PERFORMANCE

The average four valve set, lacking an R.F. stage, does not give quite the same reserve of gain and selectivity and is therefore at a disadvantage in difficult locations or during daylight hours.

Appreciating this, many readers have asked us whether a four valve receiver is likely to be a success in their district, but we can seldom answer one way or the other. To answer a question like that, one has to have information about reception conditions in that area and Australia is a very big place!

The best indication always is to make your own on-the-spot observations. If sets with an R.F. stage are hard put to it to give good daylight reception, it does not augur well for a four valve set. But, if fou valve sets in the district operate we there is no reason why yours shou not do exactly the same—or better.

It may seem that these remark represent a very negative approach the description of a new set, but w know what country readers want an the questions they are likely to as If the set is to be operated in a moc erately good reception area, and wit a good aerial and earth, then th Vibra-Four can be considered proposition. If you live in a difficu area, or want gain and selectivity spare, then go for a set with an R. stage. Those are the plain facts the case.

VALVE LINE-UP

The circuit is perfectly straightfo ward in design, with no tricks or con plications.

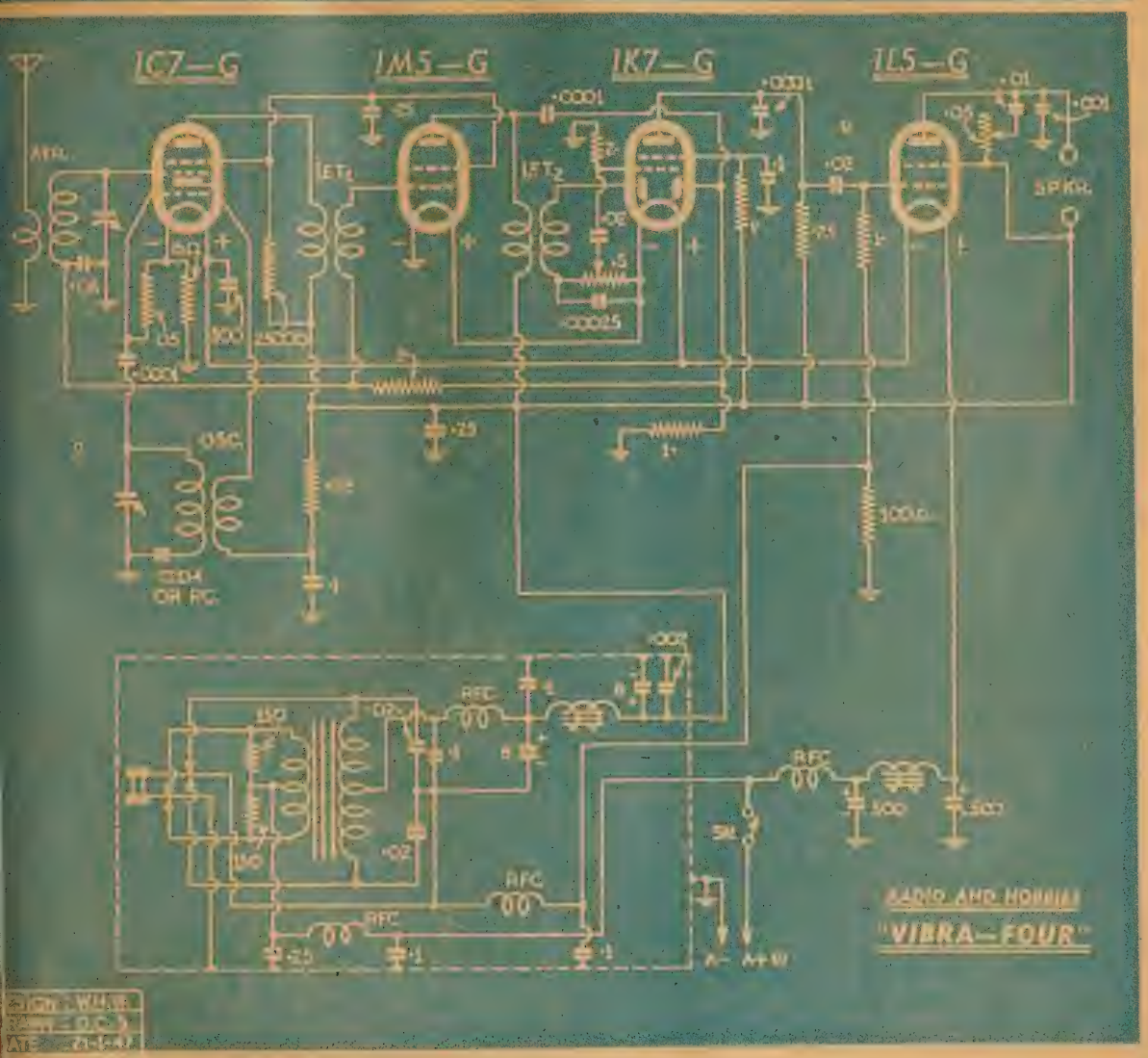
The converter valve is a 1C7-G which is followed by a 1M5-G I. amplifier. 1K7-G detector and audi and a 1L5-G output.

As with all vibrator powered se the point of immediate interest is th arrangement of the filament circu

(Continued on Page 22)

THE SIMPLEST VIBRATOR RECEIVER

CIRCUIT IS SIMPLE BUT HIGHLY EFFICIENT



The circuit gives the complete wiring of the receiver and power unit.

PARTS LIST

RECEIVER

1 Chassis 12 x 9 x 3in. (1946 "Advance").
1 2-gang tuning condenser, "H" type.
1 Tuning dial to suit.
1 Aerial coil, 1 oscillator coil.
2 465kc. I.F. trans. (iron core).
3 Valve shields.
1 3 x 3 single bank wave-change switch.
1 Low tension iron-cored filter choke.
1 Low tension R.F. choke.

RESISTORS

1 2 meg., 4 1 meg., 2 .25 meg., 1 .05 meg., 1 .02 meg., 1 16 ohm. W.W., 1 .5 meg. potentiometer, 1 .05 meg. potentiometer.

CONDENSERS

3 500 mfd. 12 P.V. electrolytics.
2 .25 mfd. tubular, 2 .1 mfd. tubular.
1 .02 mfd. tubular, 2 .02 mfd. tubular.
1 .00025 mfd. mica, 3 .0001 mfd. mica.
1 B/C padder or .0004 mfd. mica (see text).

VALVES

1 1C7-G, 1 1M5-G, 1 1K7-G, 1 1L5-G.

SPEAKER

8in. or 10in. permagnetic type matched to output valve 1L5-G (15,000 ohms).

BATTERY

1 6-volt accumulator of not less than 100 amps. capacity.

SUNDRIES

4 Octal sockets, 1 4-pin socket and plug, 2 trimmers, 2 terminals, 4 knobs, dial lamps, 3 small grid clips, nuts and bolts, 2 battery clips, hook-up wire, shielded wire, 3 feet of heavy two-way cable for battery lead.

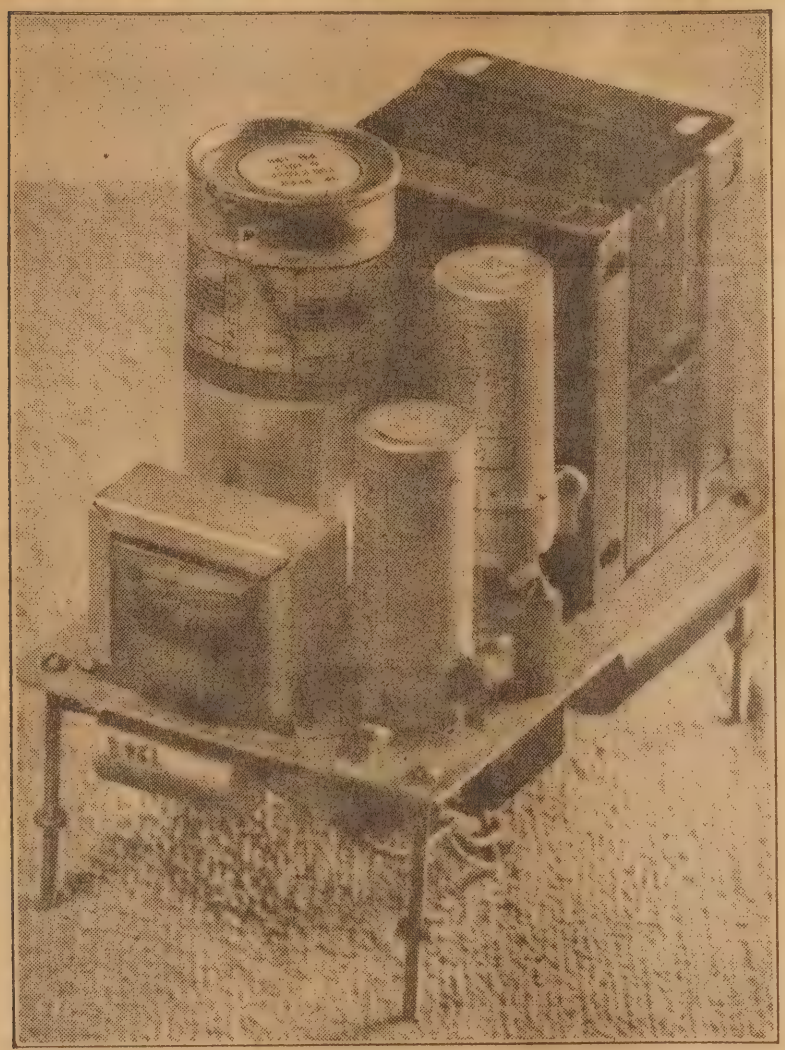
SUNDRIES

Hook-up wire, solder lugs, nuts and bolts, 4 long bolts for mounting vibrator unit, 8 small rubber grommets, 1 large rubber grommet.

VIBRATOR

1 Metal Box, 6 x 4½ x 4¾in. (see text).
1 Base plate. 5½ x 3¾in. (see text).
1 Vibrator transformer, 6-volt Pri., 135 to 150 volt Sec.
1 Synchronous split-reed vibrator cartridge.
1 Valve socket to suit vibrator cartridge.
1 High tension iron-cored filter choke.
2 High tension R.F. chokes.
1 Low tension R.F. choke.
2 8 mfd electrolytic condensers. 525 P.V.
1 .25 mfd. tubular condenser.
4 .1 mfd. tubular condensers.
2 .02 mfd. mica or tubular condensers (not less than 600-volt working).
1 .002 mfd. mica condenser.
2 150 ohm. resistors, 1W.

PHOTOGRAPH OF VIBRATOR UNIT



Photograph showing how the unit is mounted on its chassis and supported on four bolts. A can is placed around the entire assembly as a shield.

For reasons of economy, convenience and safety, the filaments must operate from the same 6 volt source as the vibrator supply, so that a series-parallel connection is required.

FILAMENT RESISTOR

Allowing for the omission of one valve, the arrangement of the filaments in this set is exactly the same as in the "Vibra-Five" receiver. The 1L5-G filament is placed at the positive end of the series network, making it initially 4.0 volts positive with respect to chassis. This becomes effective as a grid bias voltage.

The filaments of the 1K7-G and the 1M5-G I.F. amplifier are connected in series and carry half of the 240 milliamps flowing through the 1L5-G filament. Since both grids return ultimately to earth, the 1K7-G has a virtual bias of 2.0 volts, and the 1M5-G zero bias.

The other half of the filament circuit drain flows through the 1C7-G filament and thence to chassis though a 16.6 ohm resistor. This resistor is necessary to maintain the correct balance of filament current and voltage. As we have explained on previous occasions, there is a lot to the design of a series-parallel filament network and no variation should be introduced or other valve type used unless you are perfectly sure of the implications of the change.

The 16.6 ohms resistor is an unusual value but there is no reason why it should not be made available by the manufacturers on demand, or obtained by connecting say three 50 ohm resistors in parallel. The resistor must carry 120 milliamps without overheating, but a variation of a fraction of an ohm either way will not be important.

NO FEEDBACK

The screens of the 1C7-G and 1M5-G are fed through a common series resistor, which allows a screen potential of just about 67 volts with or without signal. These valves therefore operate at maximum gain, which is as it should be in a four valve set.

The 1K7-G also operates at maximum gain as a pentode audio voltage amplifier, and there is no neg tive feedback in the audio sectio

To avoid the need for still anoth chassis design, we built the set on the popular "Advance" 4/5 ma chassis. You may remember th exactly the same course was f lowed with the "1942 Pentag Four" described in the July iss Indeed, we can forsee quite a f of the "Pentagrid Four" receiv being converted over to this vibra powered circuit.

The layout of the receiver pro on the "Advance" chassis as a p fectly simple and logical one. T gang condenser mounts along t centre line of the chassis and enough back to engage the tun dial. The dial, by the way, sho preferably be one of the simpler no fly-wheel types for ease of mou ing. If you are keen to use a f wheel type dial with the "Advan chassis, you will find it necessary enlarge considerably the dial c out and to move the tuning ga further back on the chassis.

CONVERTER MOUNTING

The converter valve mounts alo side the gang, with the oscilla coil just in front. The aerial c mounts underneath the chassis, will be apparent from the pho graphs and layout diagram.

From the converter valve, sequence of components follows qu naturally. The first I.F. transfor er, I.F. amplifier valve, second transformer, detector and finally 1L5-G output valve. The aerial a earth terminal and the loudspea socket are at the rear of the chas

Mount the components on chassis in this order, taking care see that the lugs and sockets faced around to ensure the short grid and plate leads. Slip sol lugs here and there beneath holding-down nuts and join them with a length of tinned busbar. this is stretched to straighten and then installed neatly, it fo a very useful and efficient earth turn network for the various w and components.

POWER SUPPLY

Next put in the filament wi following the circuit exactly double-checking each connection you make it. After that can co the various other leads and fin the sundry resistors and condens

The job of wiring the recei proper is not a particularly diffi one and the photographs and wir diagram should materially as those who are not so used to wo ing from a schematic circuit. W the wiring has been completed checked over, attention can turned to the construction of vibrator power unit.

KP3

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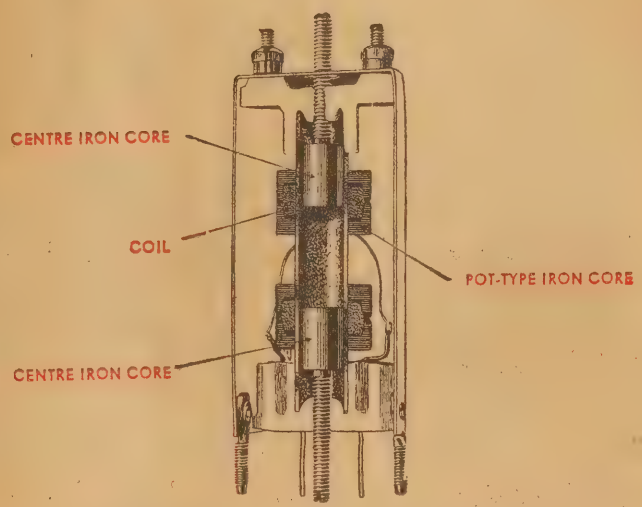
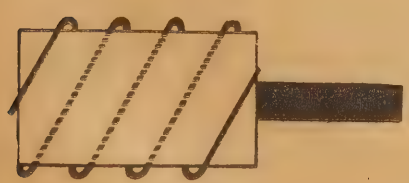


The above diagram is a cut away sketch of a PERMACLAD I.F. Tuning is done by the two centre iron-cores.



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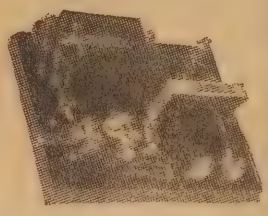

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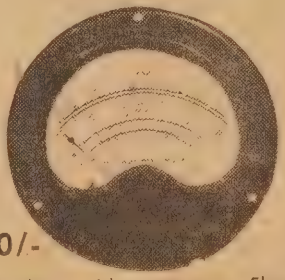

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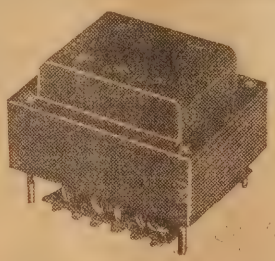

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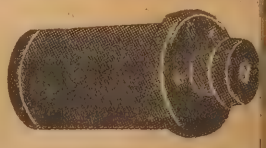

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The power supply for the "Vibra-Four" is of the same design as that specified for the "Vibra-Five," described a couple of months back. Actually it is the same original unit, which we simply transferred from one chassis to the other.

When the unit was first designed we had just this possibility in mind. By suitably arranging the shield box dimensions in the first place, we reasoned that the one unit could be adapted for any ordinary vibrator receiver or amplifier. One standardised design serves the whole range, and it is simply a matter of building the unit and bolting it into place on the chassis

Those who have the December, 1946, issue on hand would do well to read up our remarks in regard to the principle and operation of vibrator power units. Some of the points will be restated here for the sake of completeness, but not at any great length.

HASH GENERATION

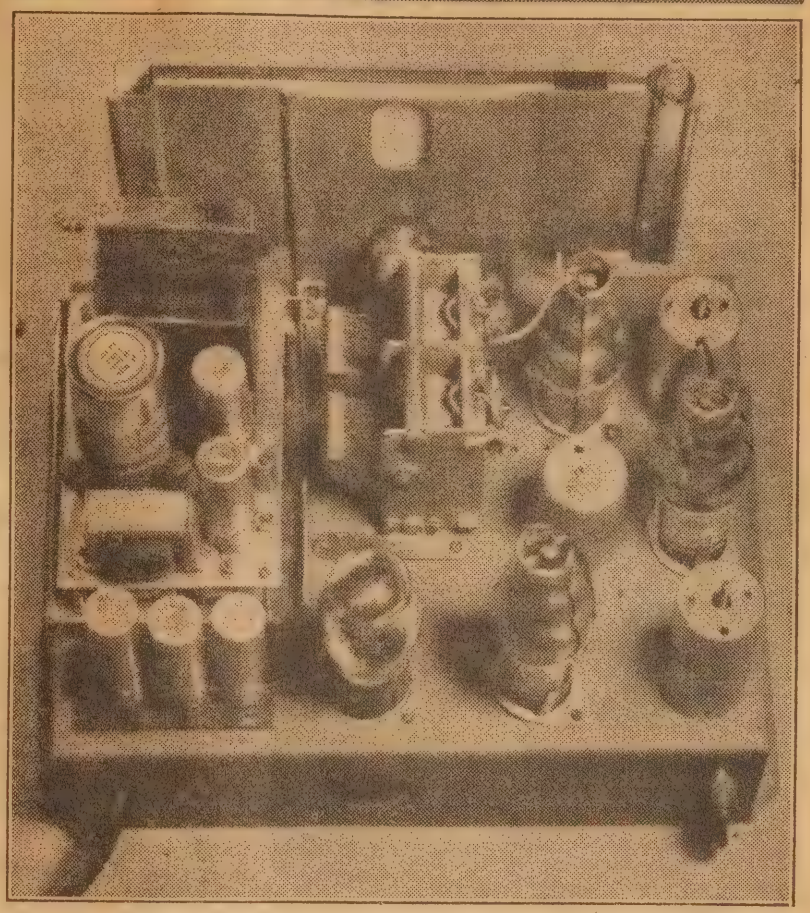
The 6.0 volts from the A-battery is converted, in the vibrator unit, to pulsating d-c, or a-c of square waveform. This is stepped up in the transformer, rectified, filtered, and passed on to the receiver as pure d-c at about 150 volts. Or rather this is the voltage which this particular unit should deliver.

In operation, the vibrator unit generates a lot of high frequency hash, which may be heard in the receiver as interference. Unless elaborate precautions are taken to prevent it, the interference can be severe enough to blanket completely the reception of broadcast stations.

We would stress, therefore, the importance of building the unit exactly as we have described it, and avoid constructional short-cuts, no matter how tempting they may appear to be. The precautions against hash troubles are electrical, in the form of extensive filtering, and mechanical, in the form of a special constructional method.

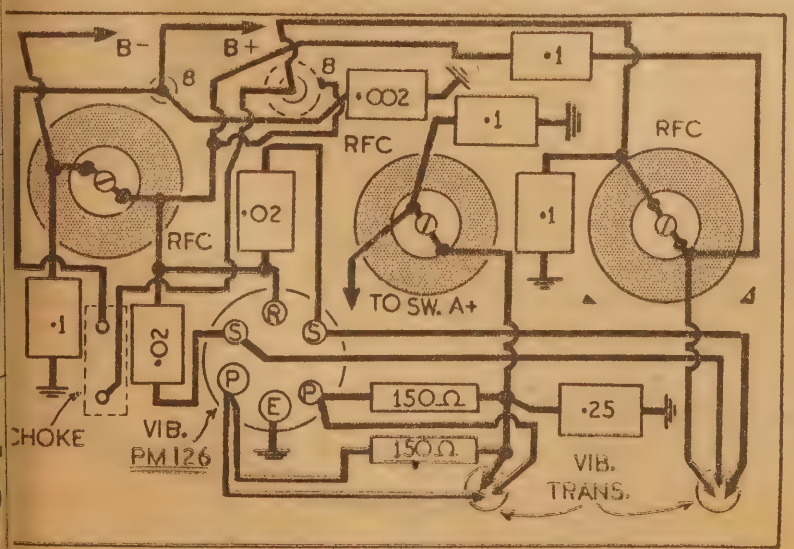
Referring to the circuit diagram, the portion shown within the dotted line is that actually enclosed within the vibrator shield box.

CHASSIS VIEW SHOWING UNIT



A good, straightforward layout is a feature of the receiver.

The vibrator cartridge used is of the split reed type, having two insulated reed sections and two primary and two secondary contacts. When ordering the parts, ask for a split-reed synchronous vibrator.



Wiring diagram of the vibrator unit itself.

The transformer used in the original set was made by Ferguson's Radio, but other brands could be employed equally well. It should be of a type rated to deliver 150 volts d-c (or thereabouts), at a maximum load current of about 25 milliamps.

When making the connections between the vibrator cartridge and transformer, remember to leave either the primary or the secondary leads long enough to allow them to be changed over. The connections determine the polarity of the d-c output voltage and, before the filter circuit is completed, the unit should be connected in the correct polarity to a 6.0 volt battery, and the high tension d-c output checked with a meter. If the high tension output happens to be negative with respect to chassis, it is necessary to change over either the primary or the secondary leads to give a positive output.

BUFFER CONDENSERS

The high tension d-c output is delivered from the transformer centre-tap. A 0.1 mfd. bypass condenser returns back to the secondary reed, which forms the high tension negative terminal.

The two .02 mfd. condensers across the secondary correct the waveform,

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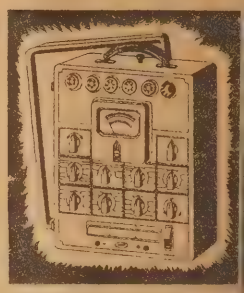

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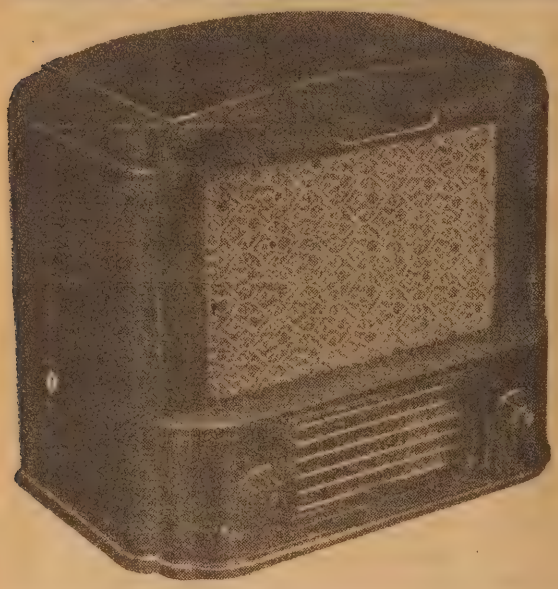

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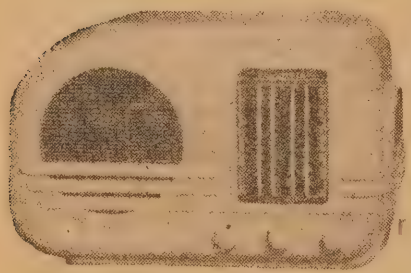

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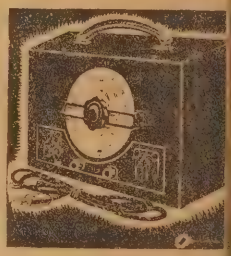

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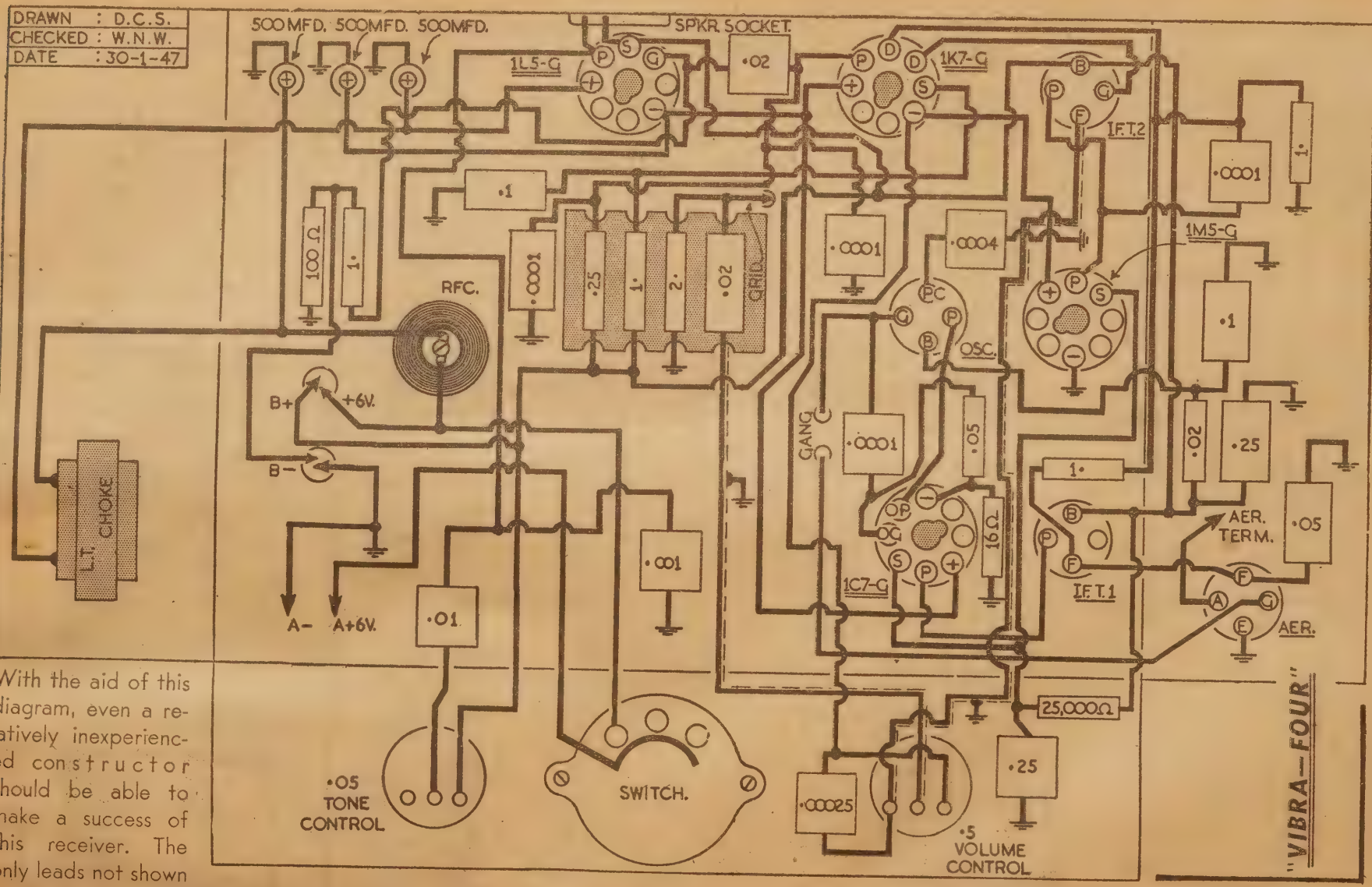


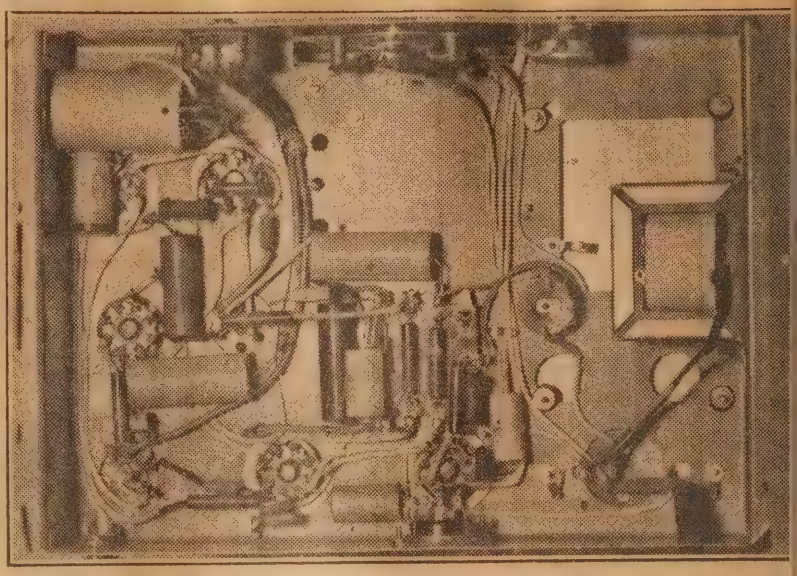
With the aid of this diagram, even a relatively inexperienced constructor should be able to make a success of this receiver. The only leads not shown are the grid leads of the 1C7-G and 1M5-G, which are above the chassis. The wiring diagram for the vibrator power unit is shown separately on page 25. The four leads passing up to it are seen just to the left of the R.F. choke.

and are known universally as "buffer" condensers. They should ideally be selected with a CR0 to suit each make of transformer, but you will find the values specified are satisfactory for most. The two 150 ohm resistors are less important items, but often assist in the elimination of hash trouble. The buffer condensers should preferably be of high voltage mica type, although 600 volt tubulars will usually give good service.

Tracing along the B-plus and B-minus leads, an R.F. choke is included in each, with a further 0.1 mfd. bypass from each one to chassis. An iron cored filter choke and an 8 mfd. electrolytic in the positive lead, filter out the low frequency hum, with a final .002 mfd. mica R.F. bypass before the lead passes out to the B-plus line in the receiver proper.

The B-minus lead from the power unit returns to chassis through a 100 ohm resistor, providing a little more than a volt of back bias for the output grid, additional to that resulting from the series parallel filament connection.

VIEW UNDER THE CHASSIS



Placement of components beneath the chassis.

ON-OFF SWITCH

Tracing the 6.0-volt circuit through, the lead from the battery passes direct to the off-on switch in the receiver. This battery lead, by the way, should be as heavy as possible and terminated by large spring clips, to ensure a minimum voltage drop between the battery and receiver.

One lead from the switch passes straight into the vibrator supply box, through a filter system to the transformer primary. (With some vibrator cartridges, and extra connection is necessary between the transformer primary centre-tap and the 6-volt pin on the vibrator base.) The purpose of the filtering in the lead is to minimise the amount of interference getting back into the filament circuit.

For the same reason, a bypass condenser and RF choke is included between the switch and the filaments. The iron-cored choke and the two associated 500 mfd. electrolytics are there to prevent hum in the output due to low frequency ripple in the 6.0 volt filament circuit.

A further 500 mfd electrolytic has been included part way along the filament network as a further precaution against hum. This condenser was not necessary in the "Vibra-Five," because of the negative feedback it employed and the lower resultant audio gain.

It should be noted in passing, that the filter chokes in the 6.0 volt circuit should all be of the low resistance type, wound with 16 gauge wire, or thereabouts. This to minimise voltage drop in the primary circuit.

CONSTRUCTION DETAIL

The mechanical construction of the vibrator unit is most important and we simply repeat in brief what was said in the December issue.

The transformer, vibrator socket, HT filter choke and electrolytic condensers are all assembled on a small, flat metal plate. As a precaution against mechanical hum, mount the vibrator socket onto the plate with rubber grommets between them. There should be no metal-to-metal contact anywhere between the vibrator in its socket and the base plate or box.

Assemble the main components on the flat plate and then completely wire the unit, keeping all resistors and condensers as flat as possible against the underside. The four leads for connection to the receiver should be left long enough to pass out through the bottom of the completed unit.

Now insert a long 1-8-inch bolt in corner of the assembly plate, protruding downwards and lock them in position with nuts. Now screw another nut on each bolt and locate them so that they are equidistant from the bolt heads and just clear of the components beneath the plate.

There should be holes in the bottom of the main shield box to receive the four mounting bolts and another larger one through which to pass the four leads. Slip the long bolts and the leads through the appropriate holes and lock the baseplate inside the shield box with four more nuts.

MOUNTING SPACE

The vibrator power unit is intended to mount over the space on the "Advance" chassis normally occupied by the a-c power supply components. As a precaution against hash troubles it is wise to insulate the box from the chassis of the receiver, except for a single bonding lead between them.

To do this, mark the positions of the four mounting bolts and drill large holes through the chassis to receive either rubber grommets or bakelite insulating washers. The latter are the more serviceable. Instal the grommets or washers and mount the power supply unit in place on the chassis, testing for continuity between the two.

Connect the low and high tensi leads into the receiver circuit and, a temporary measure, earth one of t corner mounting bolts to the receiv chassis. Add the battery lead, che everything over, and your receiv should be ready for testing.

Due to the lower overall gain, the should be fewer hash problems wi this receiver turned full on than wi the "Vibra-Five." In fact, there w no trouble whatever on this score wi the original set.

ALIGNMENT

Align the receiver in the usual w (see the July, 1946, issue) and che for interference by turning the ga full on and tuning across the band wi a shorting wire between the aerial a earth terminals.

If hash is apparent, try removing t temporary earth bond between vibrat box and chassis and see if you can fi a more satisfactory position for it shorting between them with a scre driver. If any one spot is better th another instal a solder lug and bolt the appropriate points and bond t two with a short length of copp braiding.

In stubborn cases it may be nece sary to instal an extra RF choke series with the B-plus line at the poi where it emerges from the vibrat box. Or perhaps a .25 mfd bypass the B-plus line or some point in t filament network.

Normally, however, no such ext measures should be necessary.

Once the hash problem is overco and the set is accurately aligned y will have as nice a four valver as y will find anywhere.

REDUCED PRICE FOR 807's

USING THE VALVE IN B/C SETS

Type 807 valves, manufactured in huge numbers during the war years, are now being sold at 14/6 retail, plus 2/- war duty. This drastically reduced price, subject to normal trade discounts, makes them a proposition for domestic receivers and amplifiers, as well as being a boon to amateurs.

THE 807 started life essentially as a 6L6, with the plate brought out to a top can. Refined mechanically and electrically, it has since taken its place as one of the most useful transmitting valves on the market. It is equally suitable for use as an audio power amplifier, an oscillator, or as an RF power amplifier.

Electrically, the 807 is very similar to the 6L6 beam pentode but is fitted with a five-pin low loss micanol base and has a top cap plate connection. The plate dissipation for normal service is 25 watts, maximum plate voltage 600 and the mutual conductance 6000 micro-ohms.

HIGH-MU VALVE

This high mutual conductance, coupled with the other characteristics of the valve, necessitates a certain amount of care in its use, if trouble is to be avoided from parasitic oscillation. However, self oscillation effects of this nature are by no means peculiar to the 807, for they become progressively more likely to occur with valves combining high mutual conductance and high plate current capabilities.

This is probably why the 807 has been labelled by some as a "cranky tube." Little wonder, if they are allowed to oscillate madly at a supersonic frequency while ostensibly serving as audio amplifiers. Or, again, if they perform poorly as modulated amplifiers because of oscillation at UHF.

Actually there is no need to fear instability with the 807 if one or two circuit precautions are taken as a matter of course. The precautions are quite simple and we would go so far as to say that an 807 should never be used without them.

According to the manufacturers, the most important single measure to prevent parasitic effects is to connect a 100 ohm non-inductive resistor right at the screen pin of the valve and in series with the screen voltage supply. Bypass the high tension end of the resistor to chassis with a .001 mfd mica condenser.

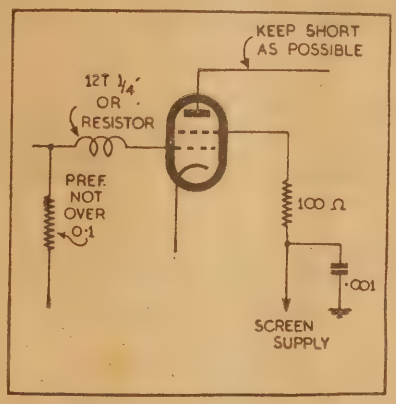
AS R.F. AMPLIFIER

When used as an RF power amplifier it is also wise to connect an RF choke in the grid circuit and one can be made up effectively by winding about a dozen turns of fairly heavy gauge wire around a lead pencil and pulling it open to space the turns a little. For audio amplifier applications, where substantial grid current does not flow, a non-inductive grid stopper resistor of 1000 to 5000 ohms can well be used.

Chokes or resistors should not normally be necessary in the plate circuit, but every effort should be made to keep the plate leads as short as possible and away from the input circuit wiring. Follow these simple rules and you can be just about certain that your 807 will do the right thing, irrespective of its circuit application.

In the light of the present bargain price the 807 takes a lot of arguing away as a valve for amplifier work and for general amateur use. Robust and reliable, a pair of them will deliver anything up to 120 watts of audio power with comparatively modest drive requirements — nominally one-twentieth that for a comparable pair of triodes.

As an RF power amplifier for class C telegraphy its maximum power output is 50 watts, with a plate circuit efficiency of some 66 per cent. and a nominal grid drive of 0.2 watt. This drive is only a fraction of that required by a comparable triode and, considering further that no neutralisation is required, the 807 is a natural choice for amateurs operating in the 10, 20, 40 and 80 metre bands.



This circuit shows how to use suppressors with the 807 to avoid parasitics.

Coming to a more detailed review of the characteristics, the valve can be considered seriously for use in the output stages of domestic receivers and amplifiers. For this purpose it can be treated as a 6L6 and used under the same ratings. A point to remember is that the plate is brought out to the top cap so that some care is necessary to prevent accidental contact with the bare metal. Even a hundred or more volts can "bite" and a voltage substantially higher than that can be positively dangerous. Use bakelite insulated caps, if you can get them, or wrap the connection with adhesive tape.

With 250 volts on plate and screen a bias resistor of 170 ohms and a plate

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load of 2500 ohms a single 807 can deliver a power output of 6.5 watts. With negative feedback operative this is ample in quality and quantity for all normal home requirements. However, remember that the plate and screen current total 80-odd milliamps under these conditions, so that a power supply and filter system of ample design is essential. The same remarks apply for the output transformer.

REPLACEMENT

For those who may want to use an 807 as a replacement for, say, a 6F6-G or a 6V6-G it is possible to overbias the valve and so reduce the plate current (and with it the power output) to the same general level as the aforementioned valves. There is not a great deal of point in making such a substitution, but it can be done.

Thus an 807 will draw approximately 40 milliamps of plate and screen current with 250 volts applied to each and a bias of approximately 20 volts. This requires a cathode bias resistor of 500 ohms. With a cathode resistor of from 350 to 400 ohms the performance will approximate more than a 6V6-G, with a total plate and screen current of 50-odd milliamps.

Actually a single 6L6 or 807 can deliver 10 or more watts of audio power under carefully arranged operating conditions. This calls for fixed grid bias, a screen voltage of 250 and a plate voltage of 350 or more. Although attractive at first glance, it is not always convenient to provide the fixed bias source and a well regulated screen supply. The use of cathode bias and a simple series screen resistor do not allow the full rated power output to be obtained.

Nevertheless, the use of a single 807 as a driver for high power class B triode is an interesting and an economical possibility. The application of negative feedback to a tetrode driver stage should permit fidelity and regulation equal to the conventional triode drivers.

CLASS A TRIODE

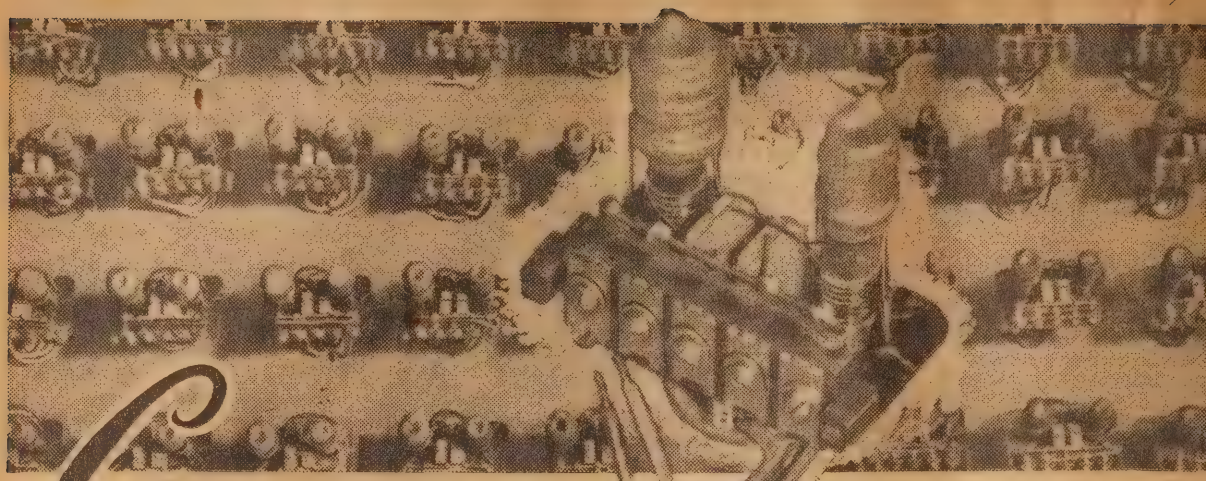
There are ratings for the 6L6 or 807 as a class A triode, but the power output in this service is comparatively small.

Like the 6L6, the 807 operates to best advantage in push-pull audio circuits.

For large domestic receivers and amplifiers the valves can be used conveniently with equal plate and screen voltage and cathode bias. A power output of 14-odd watts is available for the 250 volt conditions, rising to 20 watts or thereabouts with higher plate and screen voltages.

For still higher figures of power output it is necessary to hold the screen voltage at its rating limit of 300 volts and progressively increase the plate voltage as desired. Operating under these class AB1 conditions, with 400 volts on the plate, a power output of 30 watts is obtained. Calculation shows that this would rise to 38 watts for 500 volt operation and 46 watts with 600 volts on the plate. In each case it is naturally assumed that due adjustment is made to the operating bias and output load.

The fact that the valves operate



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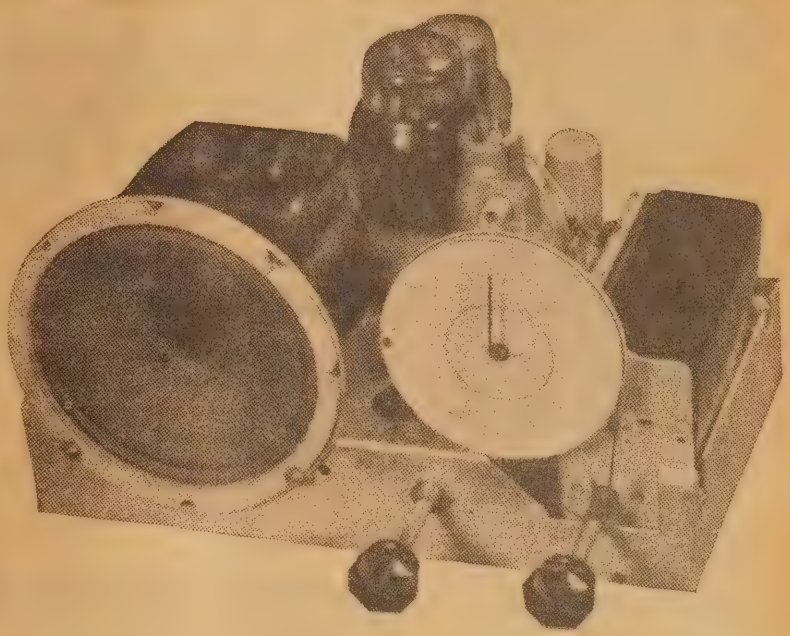
HOW TO BUILD FERROTUNE THREE

AFTER our experience with Tiny Tim II and other similar sets, we needed no convincing as to the possibilities of this three-valve regenerative set. With modern valves and components, these very simple receivers have staged a comeback in no uncertain fashion as far as home constructors are concerned.

It was with interest, therefore, that we received a sample of the new Kingsley KFT-2 Reinartz Ferrotune unit, expressly designed for use in small regenerative sets. Though it is doubtless applicable to a variety of simple set circuits, we elected to build it up first into a 2/3 valve mains-operated set.

Our circuit differs in minor details from that issued by the manufacturers of the unit, the most notable feature being the substitution of the high-gain EL3-NG output valve for the 6V6-G.

As you buy it from the shop, the KFT-2 kit includes a cadmium-plated chassis, the tuning unit carrying the dial drum, a calibrated dial escutcheon, and one or two smaller items.



The chassis has a typical Ferrotune appearance. The coil assembly is the same size as the superhet version.

Here is a novel receiver employing the age-old regenerative detector plus audio stage in new form featuring permeability tuning. It is a really good little set for local broadcast reception with a few valuable features of its own.

THE CHASSIS

The chassis is actually similar to that released for the 3/4 valve Ferrotune superhet, featured a few months back, so that there is ample room to accommodate the simpler regenerative circuit.

The tuning unit itself is secured to the chassis by four bolts and four spacing bushes, which are supplied with the kit. The rest of the assembly likewise presents little difficulty, the detector, output valve and rectifier mounting in the position shown in the photographs of the set.

The chassis is punched to take a standard 60 milliamp power transformer, and can-type electrolytic condensers can be mounted over unused holes as in the original set.

The ideal loudspeaker for the set is a five-inch permagnetic type and this can be attached to the chassis with a couple of bolts or an aluminium bracket, according to its individual mounting requirements. That is just about all there is to the assembly of the major components.

Referring to the circuit of the receiver, the grid of the detector valve is connected to pin 3 of the tuning unit through a .0001 mfd. grid condenser. Inside the unit, this connects to the top of the grid coil, the bottom of which returns to earth.

The point of difference is in the method of tuning the grid circuit. In the usual receiver, the inductance of the coil is fixed, and the tuning is accomplished by means of a variable condenser in parallel with the coil. In this unit, the parallel condenser is a fixed mica unit and the coil inductance is varied by changing the position of an iron slug inside the former.

The coil, the slug and the drive mechanism are so designed that they give a substantially straight-line frequency response, and a very smooth tuning action.

No miraculous claims are made for inductance tuning, although some points can be advanced in its favor. Essentially it must be regarded as an alternative to the condenser method, and one which is receiving increasing attention both in this country and overseas.

NEW APPLICATION

Its application to the simple regenerative set is interesting indeed, and many small-set fans will doubtless build up this receiver to observe its efficiency and behavior. Or, if you simply want a small receiver as a second set, this one has an obvious appeal because of its simplicity. From the front, it tunes and behaves just like any well-designed regenerative set of more conventional pattern.

Regeneration is provided for by connecting the plate of the detector to pin four on the unit through a .0004 mfd series condenser. This connects inside the unit to one end of the reaction coil, the other end being grounded to complete the circuit.

PARTS LIST

1 Ferrotune KFT-2 Reinartz Kit (chassis, tuning unit, dial assembly, bushes, R.F.C.).
1 Power transformer, 285v. CT. 285v. at 60mA, 5v. at 2 amps, 6.3v. at 3 amps.
1 Filter choke 60mA.

CONDENSERS

3 8 mfd. electrolytics 525 P.V., 1 .25 mfd. electrolytic 40 P.V., 1 .25 mfd. tubular, 1 .1 mfd. tubular, 1 .05 tubular, 1 .005 mfd. mica, 1 .0005 mfd mica, 1 .0004 mfd. mica, 1 .0001 mfd. mica.

RESISTORS

1 1 meg., 1 .5 meg., 1 .25 meg., 1 25,000 ohm., 1 150 ohm. W.W., 1 .5 meg. potentiometer.

SPEAKER

5 inch permagnetic type matched to EL3-NG (7000 ohms.).

VALVES

1 6J7-G, EL3-NG, 1 5Y3-G.

SUNDRIES

3 Octal valve sockets, 1 valve shield, 2 terminals, 2 knobs, nuts, bolts, solder lugs, hook-up wire, power flex, &c.

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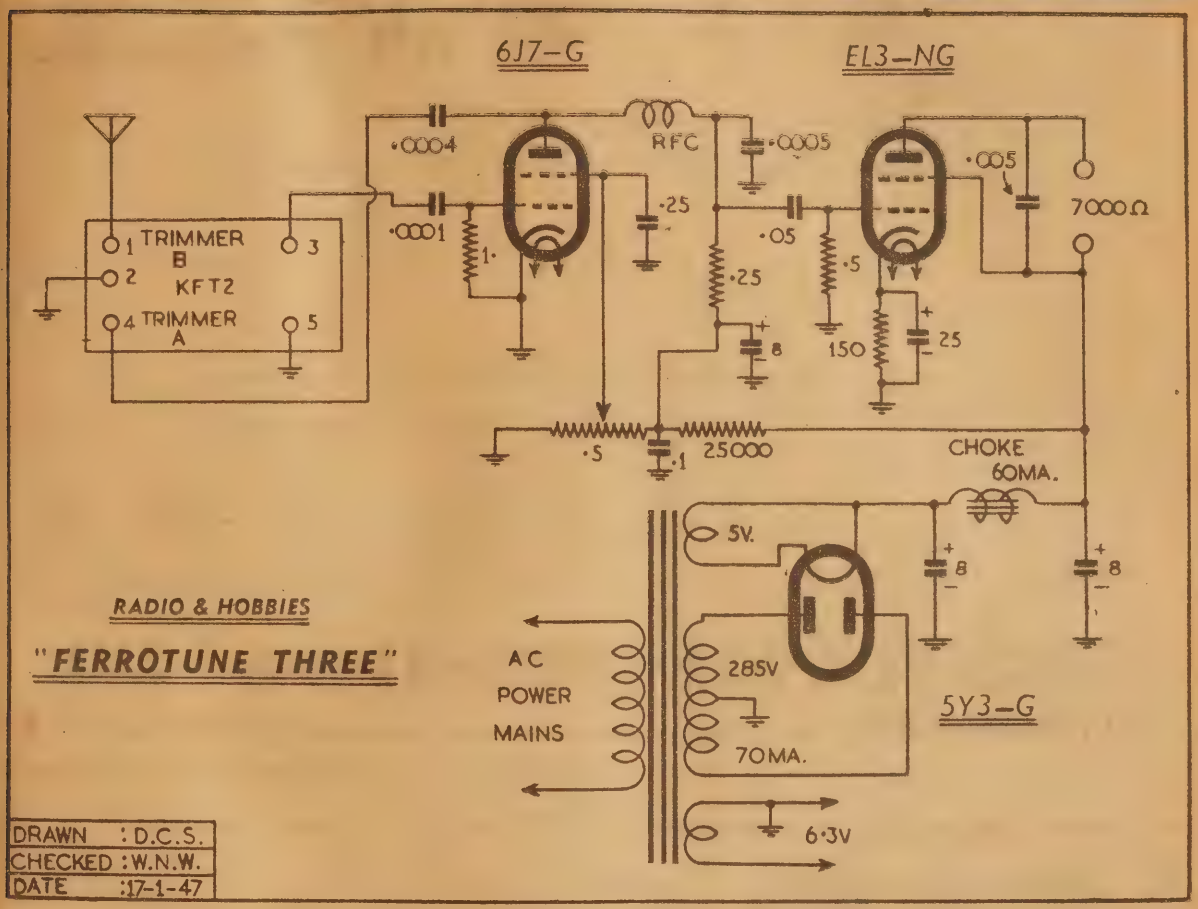
CIRCUIT OF THE FERROTUNE THREE VALVE SET



Very few parts are used in the set, which, as a result, is easy to make and has a "sure-fire" performance.

The circuit and constants around the detector valve are otherwise quite usual. A 1.0 megohm grid resistor returns the grid to earth and to cathode, which is also earthed.

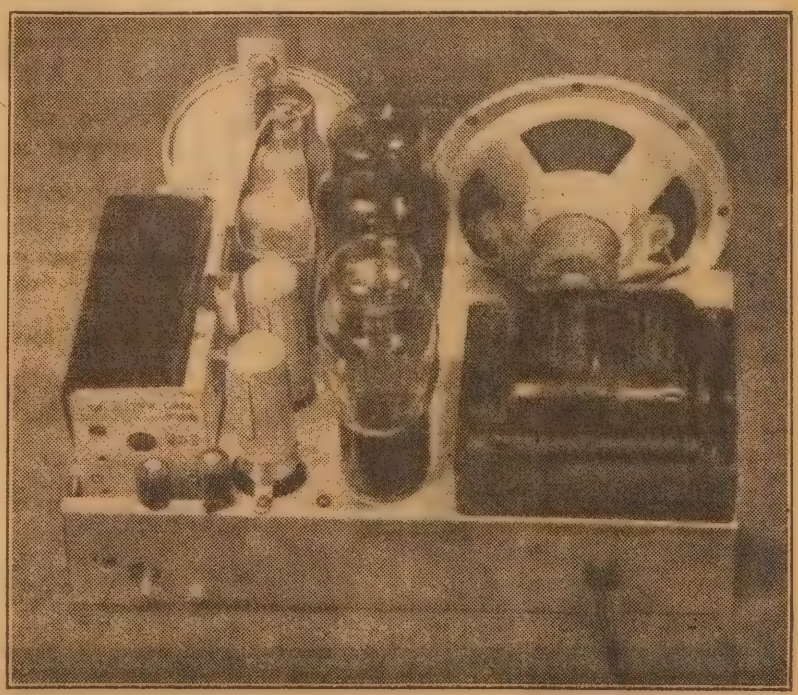
The plate is fed from B-plus through a 0.25 megohm resistor, with an RF choke and bypass as an RF filter. The RF choke, by the way, is supplied with the kit and should be used in preference to other types.

REGENERATION CONTROL

Regeneration is controlled by varying the detector screen voltage with a 0.5 megohm potentiometer, the screen being bypassed with a .25 mfd condenser. An 8 mfd condenser and a 25,000 ohm resistor provide decoupling for both plate and screen as a precaution against hum.

The signals from the detector plate are fed to the grid of an EL3-NG output valve, operating under quite standard conditions. A 6F6-G or 6V6-G output valve could be substituted with a slight loss of gain by increasing the cathode resistor from 150 to 400 ohms.

The power supply is likewise quite conventional, with a 285 volt transformer, 5Y3-G rectifier, two filter con-



This rear view gives a good idea of layout. Chassis comes ready stamped for assembly.

densers and a·60 milliamp filter choke. This arrangement assumes the use of a permagnetic loudspeaker.

Other possible combinations would be a 325 volt power transformer and a field coil of 1500 ohms in place of the filter choke. Or a 385 volt transformer with a 2500 ohm field coil in the filter circuit. In the latter case a 25,000 ohm voltage divider connected permanently between B-plus and chassis would keep the voltage within more reasonable limits during the warming up period. These suggestions are made in passing merely to anticipate some of the queries which will inevitably arise from the use of parts other than those specified.

EASY TO MAKE

As previously mentioned, the position of most parts on top of the chassis is obvious enough and the initial assembly does not call for anything more than a few tools and a little thought. Pliers, cutters, screwdriver and a hand drill will meet most requirements, but a vice, hacksaw and file will be handy if you have to make up a bracket for the loudspeaker.

In the original set we mounted the loudspeaker transformer and the filter choke underneath the chassis because they happened to fit in quite neatly that way. In some cases the output transformer is mounted permanently on the loudspeaker frame, so that no special provision is necessary for it.

Lock the reaction control in position and mount the aerial and earth terminals, taking care to insulate the aerial terminal from chassis by means of two or three bakelite washers.

Begin the wiring by connecting the transformer leads to the rectifier socket and the 6.3 volt heater leads to either the EL3-NG or the 6J7-G sockets. Be careful not to get the leads mixed up, as the 5Y3-G filament can soon be ruined by inadvertent operation from a 6.3 volt winding.

If the transformer has a marked panel, or the leads are clearly marked, there will be no difficulty on this score. But if the leads are not clearly coded it will be necessary either to measure the voltages with an a-c voltmeter or to ascertain the correct connections from the firm supplying the transformer.

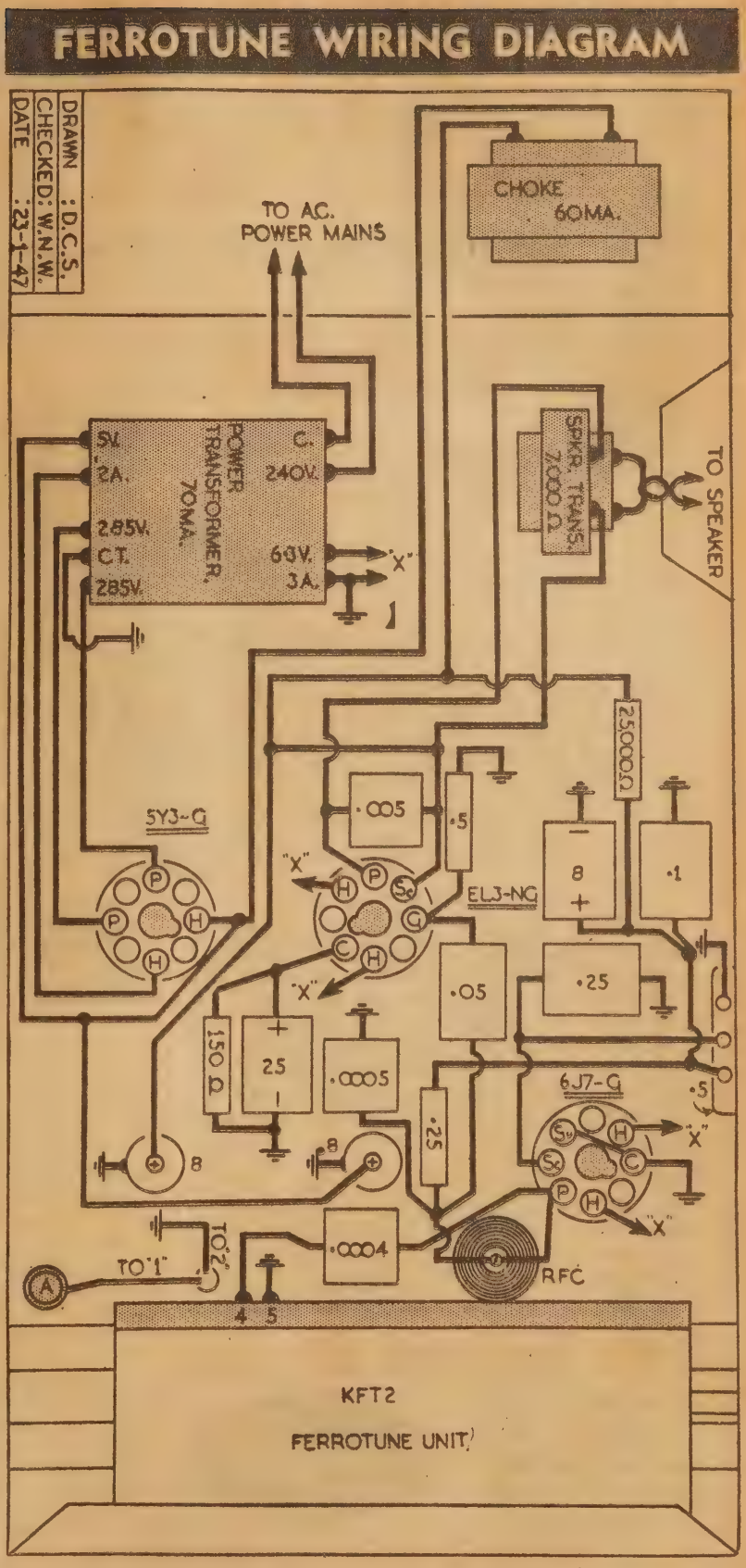
Put in all the wires you can, and then proceed to add the resistors and components in turn, ticking them off in the diagram as you proceed.

WIRING

Lugs 1 and 2 on the tuning unit are above the chassis, so that the leads to them will both normally come up from underneath through any convenient hole. The .0001 mfd. grid condenser is also above the chassis, one end connecting direct to lug 3 on the tuning unit. The other end connects to a 1.0 meg resistor, and the free end of this can be soldered direct to the metal case of the unit. From the junction of the resistor and condenser, take a lead up to the grid cap of the 6J7-G detector.

Check everything over carefully and, if you are sure that the wiring is completed and accurate in detail, plug in

FERROTUNE WIRING DIAGRAM



Here is the wiring diagram showing the position of most leads and components.

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the valves and switch on. Watch the rectifier filament for any flashing or sustained glow, which might indicate a short in the high-tension circuit. Switch off immediately if this occurs, or if the rectifier plates glow red. Don't switch on again until you have located the short and rectified it.

But assuming that the valves come up to operating temperature in the normal way, touching the finger on the detector grid cap should produce a squeal in the speaker, indicating that the receiver is very much alive.

TESTING

Connect the aerial and see whether you can tune stations in the normal way. If you advance the regeneration control too far, the set may give an audible "plop" in the speaker and a whistle will be heard as you tune across each station carrier.

In an oscillating condition, the set will radiate and cause interference in neighboring receivers, so don't let it oscillate for any length of time. The idea is to back off the reaction control until the squeal disappears and the signals are heard free from distortion. On the weaker signals, it may be necessary to adjust the control carefully to have the detector just below the threshold of oscillation. On stronger signals the control will need to be backed off more than this to keep the volume down to the required level.

There are two possible adjustments provided for in the KFT-2 unit.

The trimmer, "A," which is to the back of the tuning unit, and low down, is adjusted through a hole in the rear of the chassis. This trimmer is in series with the aerial coupling and allows a compromise to be effected between gain and selectivity.

In a typical suburban location we found that best average conditions were obtained with the trimmer unscrewed to the limit of its adjustment and even then an aerial of only five or six feet was necessary or desirable. With a longer aerial than this the reaction control had to be operated well back from the point of oscillation and some interference between stations became apparent.

AERIALS

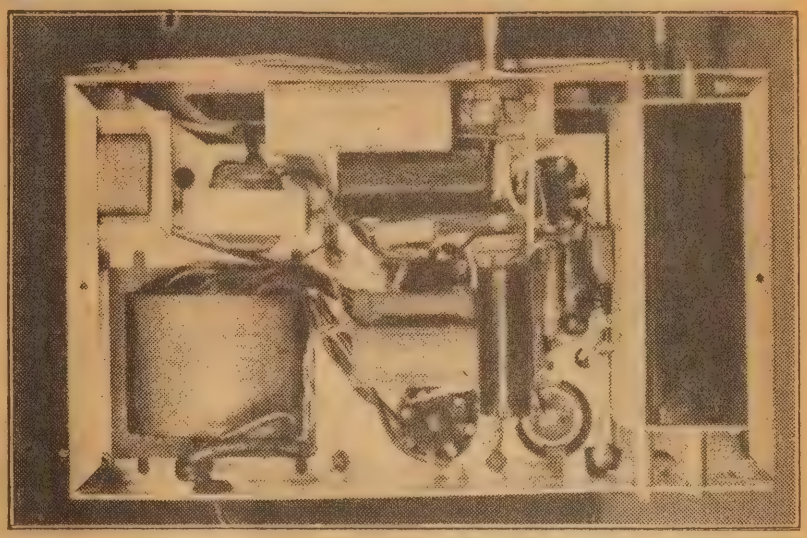
In more remote areas a longer aerial would be desirable and trimmer "A" screwed in towards its maximum capacitance position.

Selectivity is always a problem with these small regenerative sets, and the only hope of obtaining complete satisfaction under other than ideal conditions is to experiment carefully with the length of aerial and the degree of coupling to the grid circuit.

Having adjusted trimmer "A," hold the escutcheon plate in front of the dial drum and set the pointer so that it travels between the two marked limits of the scale. Then tune in a station at the high-frequency end of the band and move it to the calibrated position on the dial by adjusting trimmer "B."

With these adjustments completed, the receiver is ready for installation in the cabinet.

VIEW UNDER THE CHASSIS



This picture will show you where many small components are placed

The receiver has plenty of eye appeal as can be seen from this photograph. The panel is spaced ¼ inch from the chassis to facilitate removal and make room for loud speaker housing and dial pointer.

THE 2JU 5-VALVE

Although this is a comparatively small receiver, it has plenty of the features you look for. Straight-line, easily calibrated dial, full band-spread, all bands selected with plug-in coils, new and effective B.F.O. circuit, room for built-in speaker, A.V.C., and measuring only 14 x 7½ inches. It is the best small set we have handled to date.

LAST month we described an excellent short wave set which embodied our technical editor's ideas of what a set of its class should be. For many constructors it would be too elaborate and too large. For others it will not be big enough.

The receiver to be described here approaches the problem from an entirely different angle. We had a number of fixed points which we considered should be satisfied.

(1) The set should, in the main, be suitable for reception on all amateur bands except perhaps UHF.

(2) It should be more elaborate than a simple two-valve type which, taking it all round, can only be regarded as a starting point for a really satisfactory receiver. It should not be so big as to make it complicated and costly for the new amateur to build, or for the man who does not wish to spend too much time and money on his equipment.

(3) The set should be simple to construct, with no critical circuits or components requiring special skill in building or adjustment.

(4) Standard components should be used throughout.

In the light of these requirements the next step was to analyse how all these things could be represented by a circuit and interpreted in the light of mechanical considerations, plus the availability of components.

This last consideration is, of course, one which is always with us. Unfortunately, such things as speakers and power transformers are still hard to get, but they are obtainable from time to time, and many constructors already have components which can be used. On the other hand there is little point in specifying valves which, however useful, are likely to be more or less indefinitely in short supply. The same remarks apply to such things as multi-gang tuning condensers of suitable type, and so on.

The first point to be decided, as influencing the design of the complete set, was the matter of an RF stage. In our view there are great advantages to be obtained from the use of such a stage. Reduction of image interference is one of the most important, although even with an RF stage sufficient selectivity ahead of the converter is not always possible to completely eliminate images. The extra RF gain obtained is also valuable, particularly on frequencies above 14 mc.

The fully calibrated dial allows quite accurate frequency readings to be made, especially if a good frequency meter is available. Nickel plated handles make the chassis particularly easy to work with.

AMATEUR RECEIVER

But there is little doubt that to include the stage would add quite a bit to constructional work. Even with bandset and hand trimming condensers some kind of three gang tuning condenser would be really essential. Apart from the space required our final conclusion was that we would be better advised to concentrate on an efficient design and layout of a converter stage, accepting the simplification which would result.

BANDSPREAD

The arrangements for tuning are made much easier this way. The task of providing aerial and oscillator band-setting condensers plus full bandspread can be resolved by using three standard midget type tuning condensers, two of them for bandset and one for bandspread. Remembering that we are primarily interested in tuning over the comparatively narrow amateur bands, tracking problems are avoided by wiring the bandspread condenser into the oscillator circuit only, using the aerial bandset condenser to bring the aerial circuit into line.

The variation required of the aerial condenser is little more than a few degrees from one end of any band to the other. In practice it is possible to tune in practically any station at good strength by means of the bandspread condenser alone, provided the aerial condenser is set approximately to th right frequency. Maximum signal strength is the obtained by trimming the aerial condenser as required. O many very strong stations slight detuning of this con denser will form a handy method of volume control t obviate risk of overloading the converter stage.

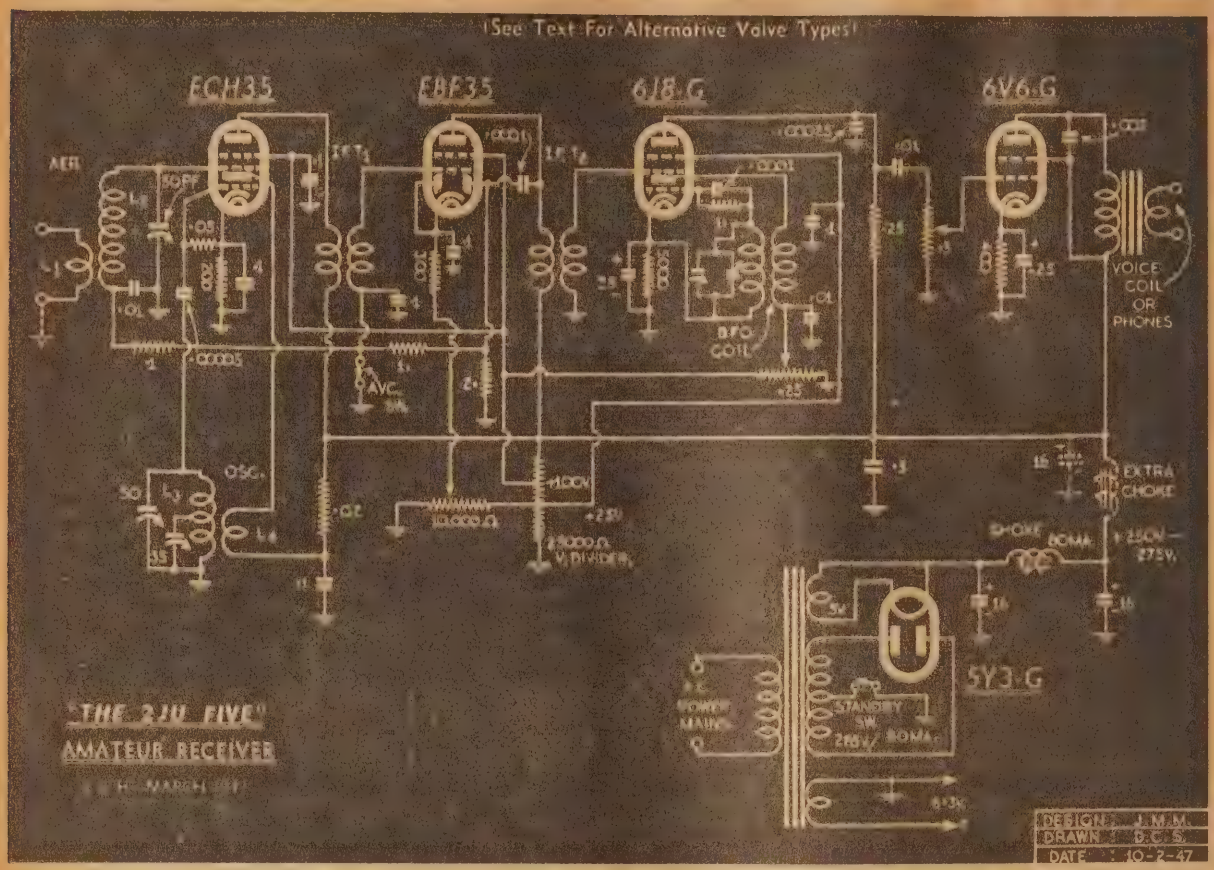
Concerning bandspread it is very hard to improve o the practice of using a standard midget condenser of abou 35 mmfd connected across portion of the oscillator tunin coil. By varying the exact position of this tapping it i possible to spread the various bands over the entire dia face. Furthermore, the minimum capacity of this con denser is connected across only a small portion of the tota coil, although this isn't particularly important in our case where the total capacity across the oscillator coil is pur posely made fairly large.

This is done for several reasons. One is that b using a fairly high "C" circuit better stability is obtaine from the oscillator than with a low "C." Inter-actio between the oscillator and aerial cir cuit tuning, commonly known as "pull ing," is also improved by using th extra capacity.

The same advantages do not appl to the aerial circuit, however. Bu in the oscillator circuit we are no concerned so much about the "Q" o the circuit as we are about stabilit

by John Moyle

CIRCUIT DIAGRAM OF 2JU 5-VALVE RECEIVER



The circuit is fairly standard except for the B.F.O. and second detector.

With modern converter valves our main consideration is in ensuring that the oscillator grid current, and hence the conversion efficiency, is of the same value as recommended by the valve makers. It is not at all difficult to achieve this and at the same time keep the "C" at a sufficiently high value

THE CONVERTER

In a set of this kind it is very hard to make a case for the use of a separate oscillator valve, particularly as we wish to keep the valve complement as small as possible. Unless the installation of the separate oscillator is intelligently made, particularly in the method of mixing to be employed, it is doubtful whether there are any advantages at all. An analysis of the performance to be expected from modern converters such as the ECH35 and 6J8G shows that their general performance on practically all counts is very good indeed. Experience with this set has shown that they will operate well, even at 50 mc, although not as well as the special valves and circuits developed for these frequencies. It might be possible to reduce "pulling" by a small amount with a well designed separate oscillator, and then only by using valves not easily obtainable here.

The characteristics of the oscillator section of present-day converters are such that good results are possible with a comparatively wide variation of oscillator grid currents and, moreover, the "slope" of the oscillator sections is such that little difficulty is experienced in obtaining the required oscillation to maintain it.

For all these reasons we decided to use a valve such as the ECH35, although other converters will operate quite well with the same general circuit constants.

THE I.F. STAGE

There is really not much choice when deciding on the best IF channel to use in a small receiver. The two main points are the number of stages required and the frequency to employ.

Taking the last point first the alternatives are 465kc. or 2000kc. approximately.

The advantage of the 2000kc. channel is that images or second spots are much less troublesome than with the 465.

PARTS LIST

1 Chassis 13 x 7 x 2¼.
1 Panel 14 x 7 and angle brackets.
1 Tuning dial as illustrated.
2 50 mmfd. midget condensers.
1 35 mmfd. midget condenser.
2 465 Kc. I.F. transformers iron cored.
1 465 Kc. I.F. for B.F.O. coil.

Fixed Condensers.

1 .00005 mfd, 2 .0001 mfd, 1 .000025 mfd, 1 .002 mfd, 2 .01 mfd.
5 .1 mfd, 1 .5 mfd, 2 25 mfd, 2 16 mfd.

Resistors.

1 2 megs, 2 1 meg, 1 .25 meg, 1 .1 meg, 1 .05 meg, 1 .02 meg, 1 5000 ohm, 1 400 ohm, 1 300 ohm, 1 200 ohm, 1 25,000 ohm divider. (All resistors higher than .02 megs. are ½ watt types.)

Potentiometers.

1 .5 meg, 1 .25 meg, 1 10,000 ohm.
2 On-off switches.
1 285 volt 80 mill power supply—see text.
1 80 mill. choke—see text.
5 octal valve sockets.
1 5 inch permagnetic speaker—see text.
Valves:—1 ECH35, 1 EBF35, 1 6J8G, 1 6V6GT, 1 5Y3G. Knobs, scale plates, nuts, bolts, valve clips, etc.

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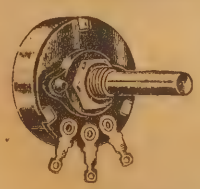

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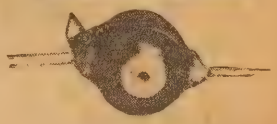

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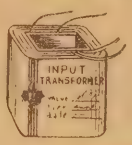

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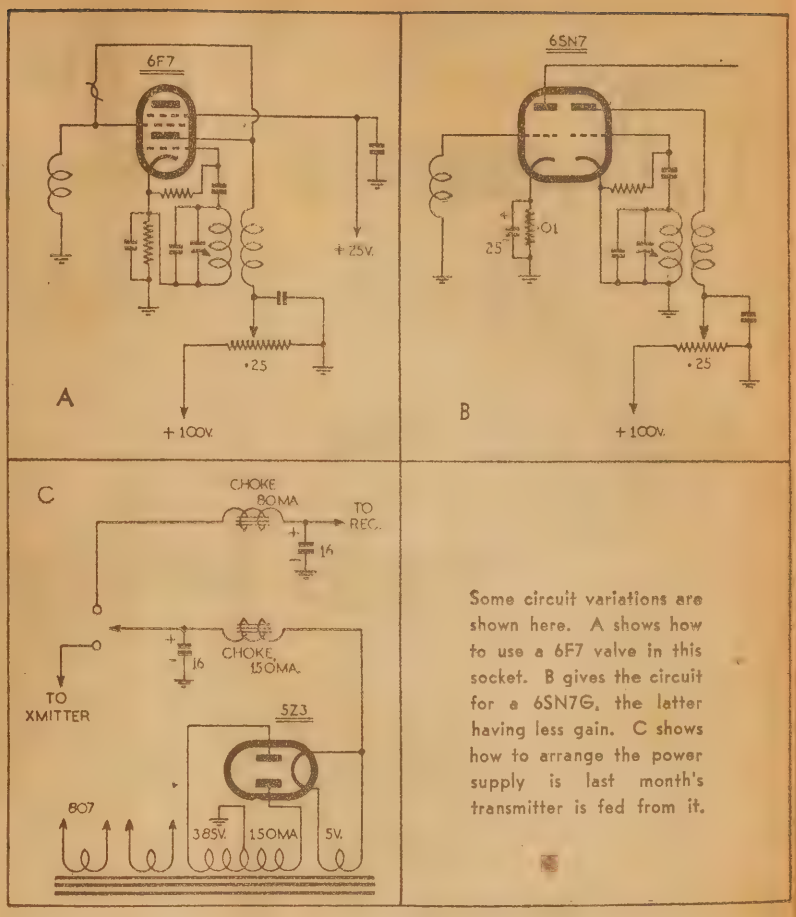
This is because the images fall 4000kc. away from the signal, instead of less than 1000kc. Almost any receiver can be selective enough to reject unwanted images in the first case, but only a good one can completely reject them in the second. On the other hand, the overall gain per stage is considerably greater at 465kc., so much so that at least two stages at 2000kc. would be required to give equivalent results.

Even so, selectivity with a single 465kc. using modern IFs would still be better than with two stages using the alternative frequency. So, apart from anything else, it looks as though a single 465kc. stage wins out all round.

Properly adjusted, the IF gain from such a stage is just about as much as we require, even if two stages were available. Two 465kc. stages would further increase selectivity — quite a good thing—but it is still pretty good as it stands. We do not need the second stage if this selectivity isn't essential. And if we did we would bias them back to little more than the same gain as we get from a single stage, out net advantage being better station separation and somewhat lower valve noise.

As a matter of fact there is room on the chassis to add a second IF stage should it be desired. However, for the moment, we can't consider the extra components and valve as justified, remembering our desire to keep the set to a modest size.

Our results are improved by using a high-gain pentode as the IF amplifier. The EBF35 has, in addition, two diodes, one of which we use for AVC.



Some circuit variations are shown here. A shows how to use a 6F7 valve in this socket. B gives the circuit for a 6SN7G, the latter having less gain. C shows how to arrange the power supply is last month's transmitter is fed from it.

USE OF A.V.C.

Opinions are somewhat divided on the matter of AVC. Our view is that for general use it is essential if the nerve-wracking blast from strong stations is to be avoided when searching for faint signals with the gain open. On the other hand, we cannot avoid connecting the diode circuit across one of the IF tuned circuits to obtain it, thus reducing by a small amount both IF gain and selectivity.

We have used a biassed type of second detector to avoid the damping of diode detection, so that if you are a straight "CW" man and don't mind the overloading of strong signals you can quite easily leave the AVC out, under which conditions none of the IF circuits will suffer from diode damping.

However, we found that in practice the gain of this stage is such that the IF valve may be somewhat regenerative with its gain control wide open, meaning that loss of gain isn't a worry. The selectivity is also quite good, as evidenced by the definite "single-signal" effect obtainable with the BFO. Moreover, the regenerative effect, which is often deliberately introduced to obtain a bit more gain, also sharpens the tuning, so we are essentially back where we started from.

REGENERATION

There are, of course, many arguments against regeneration in any form which, if pushed to extremes, increases noise level sufficiently to offset the extra gain. You can, however, please yourself about this. Sometimes a short length of wire placed so that it loosely couples the grids of the IF amplifier and second detector is introduced deliberately to provide enough feedback to make the stage regenerative. We have tried all these methods, but our impression is that the gain is plenty as it stands, and regeneration may well be disregarded. Our set tended to arrive just below oscillation with the bias reduced by the manual control to about three volts, indicating that the stage was stable right up to the point of maximum gain.

If IFs of a lower gain are used regeneration might be worth a trial.

SECOND DETECTOR

The AVC is turned off by a switch earthing the AVC line, as would be the case for straight CW reception. The IF gain is then controlled by the potentiometer, which varies the EBF35 bias up to 25-volts negative. The 300 ohm fixed resistor allows rated bias to be applied when AVC is being used.

Of all the stages the second detector gave us the most food for thought. In order to save another valve we wished to combine the detector with a BFO circuit. There are a number of ways this can be done.

A method often used is to make the second detector oscillate, using a leaky grid circuit. This provides the beat note, but the fact that the valve is oscillating means high noise, and de-tuning of the IF feeding it. Also the circuit is sometimes found to be tricky if smooth oscillation is required.

A better scheme is to use a double valve such as the 6SN7, 6F7, &c., with one section operating as a detector and the other as the BFO. Our vote would probably go to the 6F7, with the pentode operating as a biassed detector and the triode as BFO. Enough coupling will probably be present in the valve itself to give a good note. However this valve isn't easy to get, and we haven't used it for this reason.

A good valve is the 6SN7, which has two entirely separate triodes in the one envelope. The only disadvantage here is that the triode detector gives less gain than would a pentode.

The valve finally decided upon was the 6J8G converter, which is in as good supply as any valve at the moment.

Here we have a pentode which will

COIL DATA

Band	L1	L2	L3	L4	Top
3.5 m.c.	8	45	10	32	19
7 m.c.	5	25	6	14	4¾
14 m.c.	5	12	4	7	2½
28 m.c	3	6	2	4	1½

All coils wound on valve bases with wire approximately 22 gauge. Spacing between L1 and L2, and L3 and L4 about ¼ inch. L1 and L3 occupy 1 inch.

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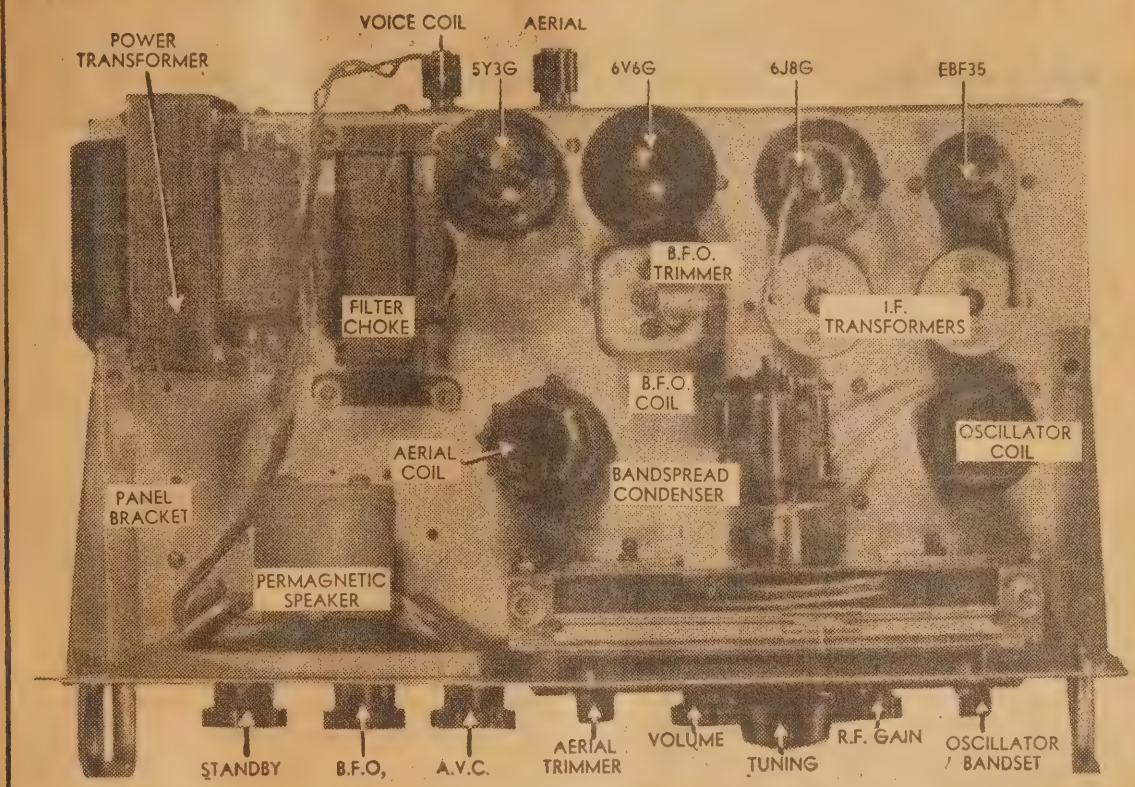

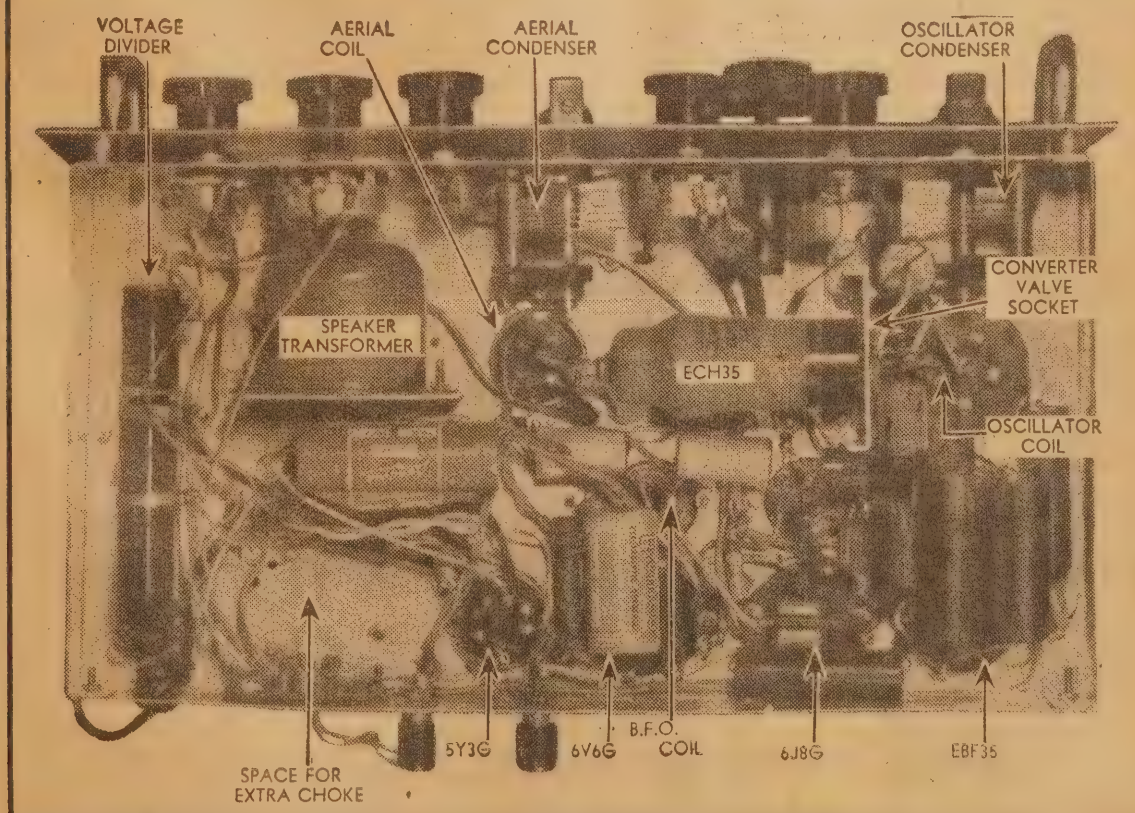

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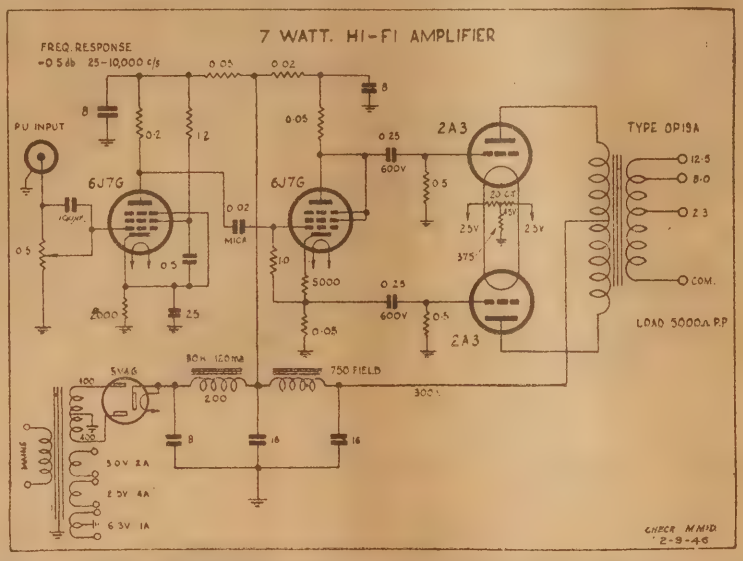
By employing a tapped secondary winding it is possible to ensure correct impedance match for any of the better class loud-speaker units available.

Insertion loss, frequency response and power handling capability of this transformer have been kept at a high standard by using an interwound winding on a generous core area.

When used in conjunction with a high grade pick-up and well loaded speaker unit, this amplifier will meet the demands of the most particular Hi-fi enthusiast



We have received numerous compliments from constructors of the 7 watt High Fidelity amplifier. Here is a letter from a Motion Picture Technician in a leading Sydney theatre.

COPY OF LETTER

Messrs. Ferguson's Pty. Ltd.,
12 McMahon Street, WILLOUGHBY.

26 Mooramie Avenue.
Kensington, SYDNEY.

Dear Sir,

I wish to take this opportunity of expressing my complete satisfaction with your Fidelity 7 watt amplifier circuit as published by your company in recent trade papers.

I constructed this amplifier and used the transformer as specified by your circuit and believe me it has turned out a winner.

The amplifier has been in operation for several weeks now and during that time it has been heard by many interested people, all of whom have expressed their approval in no uncertain terms. They were particularly interested to hear that the transformer was made in Australia, and were unanimous in saying that they considered this a pretty good achievement, as undoubtedly the success of the amplifier is due in no small measure to the output transformer used, which certainly gave true Fidelity results.

May I add in passing that I am a Motion Picture Technician of some twenty years' experience and consider myself a very fair judge of sound. In my opinion this circuit of yours results in a really good true Fidelity amplifier.

Wishing your organisation continued success,
Yours faithfully,
(A. B. Morris).

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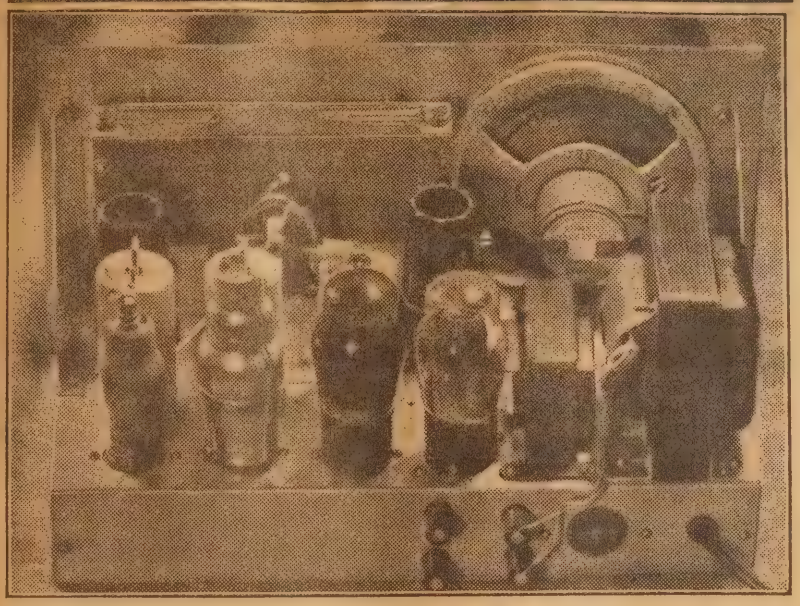
A REAR VIEW OF THE SET



Further details of layout are shown here. The socket was used to connect the transmitter when a larger power supply was mounted on the chassis.

give good gain as a biassed detector and a triode for the BFO mixed internally into the electron stream of the pentode.

B.F.O. CIRCUIT

This valve, because of this fact, tends to pack up if the oscillator section is allowed to generate too much RF, as it will if used under the same conditions as for converter operation.

However, we have managed to turn the rather tight coupling between sections to good advantage by using in place of the normal "On-Off" switch a potentiometer capable of applying up to 100 volts positive to the oscillator plate. This voltage is obtained from the same voltage divider tapping as feeds the detector screen.

We now have a control which enables the BFO to slide into oscillation just as smoothly as any normal regenerative detector. We can as a result adjust the magnitude of the heterodyne beat to suit the strength of the signal we are receiving. The advantages are that the noise which generally results when the BFO is switched on is reduced to the absolute minimum, and on very weak signals is scarcely discernible. At the same time, by advancing the BFO control near to maximum we can beat even the strongest signals without any trouble.

The result is one of the best and sweetest BFO circuits we have ever used. An old IF transformer forms the BFO coil, with the trimmer condenser removed from the winding used as the "tickler." To vary the beat note we wired a 3-30 air dielectric trimmer in parallel with the trimmer which still remains across the grid circuit. This allows adjustment to be made by screwing the trimmer by hand in or out of mesh, and avoids the need for another panel control. A small variable condenser could, of course, be mounted on the panel if required, but in most cases it will be used only now and then, and the trimmer idea will probably meet the case just as well.

AUDIO AMPLIFIER

The audio amplifier is a 6V6G with a little extra bias to keep the total set current drain to a minimum without affecting the usable output wattage. The audio volume control is in its grid circuit.

The speaker transformer we mounted under the chassis, bringing the voice coil leads to a pair of terminals at the rear of the chassis. This allows the speaker to be connected, or alternatively the phones, without the need for still another "control" in the form of a jack on the front panel. The matching for low impedance phones is good enough to allow plenty of volume—at least as much as would be obtained by tapping the detector output for phone connection. Even standard phones will work quite well from the voice coil winding, particularly as musical quality is scarcely needed for phone work.

POWER SUPPLY

Almost any combination of power transformer, filter choke, or speaker field can be utilised with the set. We originally built it with a 150 mill. power supply on the chassis, which we switched across to the transmitter described in last month's issue, as required, thus operating both units from the same supply. A circuit showing how this was done is given here.

Regarded purely as a receiver, however, the requirement is for a power supply of about 80 mills, either with a filter choke and a permagnetic speaker or with an energised field coil with or without an extra choke. We used a

permag. speaker, a 285 volt power transformer, and a single filter choke. There was a slight hum audible in the speaker, but only if one listened rather carefully, and not nearly enough to be audible over a signal. In any case, an extra filter choke is a simple matter to tuck under the chassis.

SPEAKER FIELDS

If an energised speaker is used a 325 or 385 volt transformer would be used to suit the speaker field resistance.

We mounted our power transformer above the chassis with a pair of brackets to allow as much room beneath the chassis as possible. Most transformers these days have leads instead of a panel for connections. If a panel is used it is a good idea to cover it finally with a small sheet of insulating material to make contact with high voltages impossible.

There is a difference of opinion about mounting the speaker on the chassis at all. We placed it there for its undoubted convenience, and because we found acoustic feedback to be almost completely absent. There is no need to put it there if your speaker isn't suitable or if you have any trouble with feedback.

The remainder of the circuit is self-explanatory, so we will pass on to some constructional points.

The chassis is the same size as that used for last month's transmitter, thus allowing the two to be combined in a rack if desired. The panel is mounted away from the chassis front to avoid having controls bolted to it, to allow space for the dial pointer to move freely, and to help accommodate the speaker. It is mounted on two brackets and also bolted to the chassis with small stand-off washers.

TUNING DIAL

We used a straight-line dial because it is easily obtainable and because the convenience of being able to hand-calibrate each band is worth its weight in gold.

The band-spread condenser is mounted on two brackets, and the greatest care should be taken to make a firm job and to see that the condenser and dial are perfectly aligned. A brass bushing is generally used with the small condenser shaft, and it can be suitably packed to get this alignment without much effort.

The converter is mounted under the chassis parallel with the front panel. A glance at the illustrations shows how this shortens the leads from the band-set condensers and the coil sockets. The longest lead is only about one inch.

With this valve under the chassis, and possibly a small filter choke, there is a certain amount of heat found there. To compensate for this, holes are punched in the chassis sides for ventilation. We have not found stability to be noticeably affected on this score.

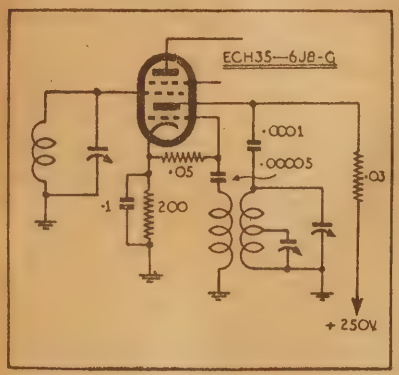
Although there are a fair number of small parts mounted in the vicinity of the converter valve socket you won't have much trouble in fitting things in if you use "½-watt" resistors and leave the larger components, such as the by-pass condensers, until the last.

(Continued on Page 75)

A stand-by switch is fitted, which can be used to switch the high tension from receiver to transmitter if the same power supply is used for both.

Reverting to the dial, the original calibrated scale can be removed by taking out the appropriate little bolts and a piece of white card placed there instead. After calibration the card can be removed and redrawn in Indian ink. The dial has a pair of lamps fitted, so that indirect lighting is another feature. The pointer can be removed and carefully hammered to a thin edge for accurate reading, or replaced by a transparent cursor if you are very fussy.

Most of the coils can be wound on valve bases, except perhaps the 80-metre coils, which really need standard formers, and the 50 mc coils, which are wound on half-inch former wired into a valve base. Full information concerning them is in the coil winding table.



Circuit showing how plate tuning may be used for the oscillator.

There are a number of alternative valves, &c., which can be used in place of those shown. The only variation in results will be observed in cases where the valves themselves have, for instance, a lower gain than those specified. However, the set is most flexible in this regard, and our version can be regarded as having just about the maximum practicable gain of them all. Even with lower gain IFs, a 6SN7 second detector, and a standard RF pentode as IF amplifier there should still be plenty of "tow."

TUNING

You will find that using the coil data given, the oscillator band-set condenser will peak on the band with the plates varying from half-way to three-quarters fully meshed. Our coils were made up to give band-spread over the full dial face on each band, allowing for 300 kc. on the 7 mc. band in case we get the extra 100 kc. back which we had before the war. It is rather too much to hope that yours will work out so exactly that a small variation in the position of the tap will not be required to duplicate these results.

As the exact number of turns on the oscillator coil is not critical, it may be more convenient to add or remove a turn or two from the grid end of the coil rather than move the tap itself.

If the band-spread is too much, turns should be added, and if too little, turns should be taken off. The inductance may be varied within finer

limits by closer spacing of the turns above the tap to decrease band-spread, and wider spacing to increase it.

In the case of the aerial turns, sharper aerial tuning will be obtained by using enough turns to bring the peak with the condenser nearly out of mesh. To do this, you will probably find a few turns will need to be added to the numbers we have given. Our aim was, however, to strike a set of coils which were well within limits. There is always the possibility of slight variations one way or another to suit individual receivers.

The most critical coils will be the 28 mc. and 50 mc. sets. Here spacing between windings will alter the inductance quite a bit, and a little experiment will probably be called for to get best results. A common fault with these coils is to couple the aerial too tightly, thus flattening the tuning and making it hard to get an aerial peak. This is particularly noticeable with a doublet of other resonant aerial.

COILS FOR 50mc.

The 50mc. coils are wound on ½in. formers mounted inside the valve bases. L.1 has five turns close wound, 1-8in. away from L.2, which has seven turns of 20-guage enamelled wire, spaced the diameter of the wire. L.3 has six turns of the same wire tapped at two turns. L.4 has two turns interwound with the bottom of L.3.

With these coils the aerial trimmer should peak with the condenser plates nearly all out, and the oscillator band set should peak with the plates about 25 per cent. in mesh. The oscillator grid current with these coils will show approximately 60 to 80 microamps instead of the 200 microamps obtainable with the coils for the other bands. The set works excellently on 50mc. and has received most of the local stations at excellent volume. A separate loudspeaker is advised for the band, as, if mounted on the panel, acoustic feedback tends to be rather pronounced.

L.1 and L.4 for all bands are wound with wire about 30-gauge.

We have included a circuit showing how plate-tuning of the oscillator can be used instead of grid tuning. There is theoretically an advantage with this circuit in that as the mixer grid of the ECH35 and the 6J8G is connected to the oscillator grid, pulling between aerial and oscillator circuits can be expected to be somewhat less than with grid-tuning. The coil data remains the same, and it is a simple matter to try both methods. Unfortunately, we hadn't time to make an exhaustive comparison between the two methods, but it should be well worth a trial.

The oscillator is tuned higher in frequency than the signal, except on the 14mc. band, where images from S.W. broadcast stations will be much more of a nuisance than a few commercials which might appear. There is a drop in gain by doing so, but not enough to prevent any signals worth hearing from being received.

The set will be found very smooth in operation, particularly stable, and free from drift. In all our tests with it, performance has been everything we could expect.

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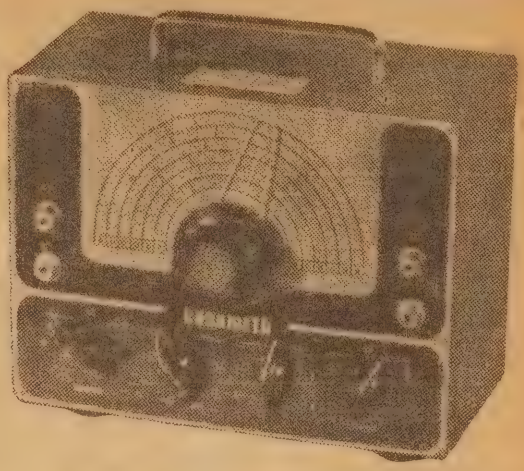

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DEVELOPMENTS IN DISC RECORDING

A recent issue of the Proceedings I.R.E. (Aust.) carries an interesting article by R. V. Southey, Recording Dept. manager of the Columbia Gramophone Company. In it the writer gives the background to the much discussed F.F.R. (full frequency range) technique.

MR. SOUTHEY makes the point that there has been no radically new development in disc recording technique since the inception of the electrical method. Rather has there been a gradual evolution and refinement over the years. The present talk of F.F.R. recording springs largely from advances which have been held up during the war years and from an effort to standardise the advances throughout the various studios and factories.

The frequency range of the average prewar home record was limited at the high end to 6000 c/s. However, very few reproducers could handle even this limited range, because of the frequency response of the pickup and the surface noise of the records.

The recording range has now been taken up to 13,000 c/s and this range can be preserved without appreciable loss during the factory processing, provided certain precautions are taken.

NOISE PROBLEMS

The desirability of an extended range has always been a debateable point, the issue being confused by problems of noise. However, recent work with direct playback discs has allowed a better appreciation of the possibilities of extended range.

The variation in the frequency response of the adult ear largely accounts for differences of opinion regarding the effect of better treble response. However, people with a cut-off, at say, 5000 c/s, can appreciate a better "attack" in reproduced music if the system is extended to 10,000 or 12,000 c/s. This is due to better transient response.

Reverting to the subject of record noise, the well-known hiss is due to particles in the hard pressing. When these are eliminated by using plastic without a filler, the hiss is reduced to a point where it becomes less annoying than the clicks and crackles which it previously masked.

These latter noises, in turn, are due to processing faults and to scratches on the wax or cellulose master. The extended range, therefore, sets a hard problem in production for the processing engineer and chemist, but the problem is not regarded as insuperable.

The recording engineer can control the characteristics of the system, the processing and quality of the discs and the size and shape of the record grooves. Equal attention must be paid to the reproducing needle, the characteristics of the pickup and to

the rest of the reproducing system, before the improved recording can be appreciated.

The ideal playing needle has a hemispherical end of .0025in. radius, and a 30 degree taper, when working with the accepted standard groove. The fact that commercial needles depart from this ideal shape has necessitated in the past the inclusion of an abrasive filler to prevent sharp and heavily-loaded needles tearing the record material.

Chromium-plated needles are hard and have low friction. Sapphire points also have a low coefficient friction and almost indefinite life if the needle pressure can be reduced to 10-15 gms or less. The newer small inertia pick-ups with correct needle shape, suffer very little high note response when playing the inner grooves of the record. At 12,000 c/s the loss at a 2in. radius track is only about 8 db.

The loud-speaker and listening-room are probably the most serious problems in the way of smooth and firm frequency response. Boomy effects are likely in the usual small listening-room and people will not accept bulky baffle arrangements.

The loud-speaker itself is very much a compromise between performance and price. The polar distribution of many speakers begins to depart from the spherical at 3000 odd c/s and a dif ference of 25 db. may be evident at 8000 c/s between the sound pressure on the axis and that to one side of it. The position is further aggravated by placing the speaker close down to the floor level.

Other methods of recording using strip and film have been developed considerably during recent years, but they generally lack the simplicity of handling and the versatility of the disc. Attention has been paid also to stereophonic reproduction and quite startling results can be achieved. However, the complexity and cost of duplicating the recording medium and the reproducing equipment—including an extra amplifier and loud-speaker system—rules out development of the system for general home use.

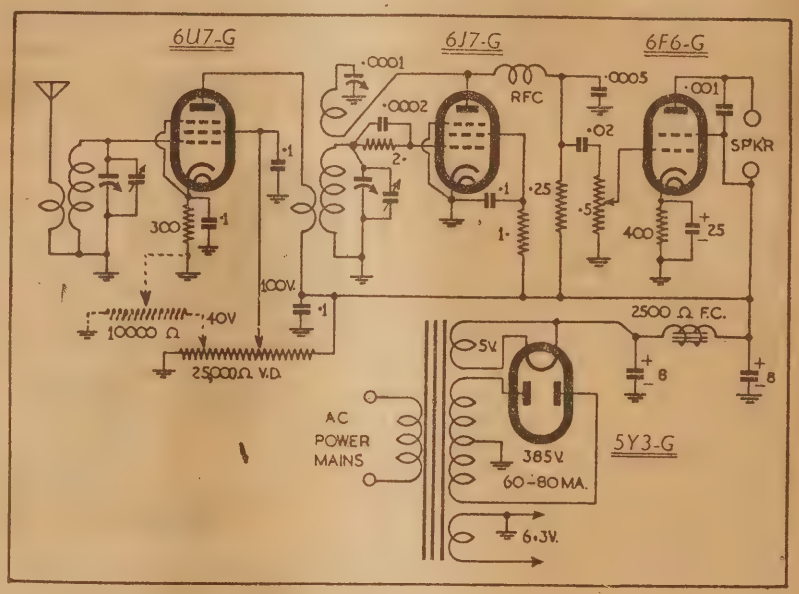
To a certain extent, the limitations of the single channel system can be overcome by skilful control of accoustics and microphone placement.

A READER BUILT IT!

Gadgets and circuits which we have not actually tried out, but published for the general interest of beginners and experimenters.

REGENERATIVE SET WITH AN R.F. STAGE

From a reader in Naracoorte, S.A., comes a circuit of a four valve regenerative set using one R.F. amplifier stage. Though operated in a poor reception area, the receiver manages to tune several interstate stations at good loudspeaker strength.



THE RF amplifier valve can be any supercontrol RF pentode such as the 6D6, 6U7-G, 6K7 or similar. It operates with about 3.0 volts of cathode bias and at a screen voltage of 100, tapped from a 25,000 ohm voltage divider.

This feeds into a 6C6 or 6J7-G pentode detector, with condenser controlled reaction. The detector is followed by a pentode output valve, which can be a 42, 6F6-G or 6V6-G. An 80 or 5Y3-G rectifier in a standard power supply hookup completes the circuit.

In the normal way, tuning would be accomplished with a two-gang condenser, with trimmers fitted in parallel with each section. These may be included as part and parcel of the gang, or may need to be added as extra items. The trimmers allow the tuning circuits to be peaked for maximum response at the high frequency end of the band.

The coils required are a standard aerial coil and an RF coil to match, with reaction winding. Two coils of the same brand should be used to ensure proper tracking. The screen voltage for the RF amplifier should be set at 100 volts so that it is operating under maximum conditions.

The detector screen is fed through a 2 meg. series resistor, which allowed us to get the right degree of reaction control in the original set. If the reaction is uncontrollable reduce the screen voltage by increasing the value of the series screen resistor. Inadequate reaction requires just the opposite treatment.

The circuit suggested by Mr. Francis provides for a gain control in the grid circuit of the output valve. Some gain control is certainly desirable in addition to the reaction condenser in order to allow the reaction to be used to the best advantage in the interests of selectivity.

In the vicinity of strong stations there may be a tendency for the detector to overload with the RF stage operating permanently at full gain. Our own suggestion, therefore, is to eliminate the audio volume control and substitute instead an RF gain control in the cathode circuit of the RF amplifier valve. The necessary connections are shown dotted in the circuit diagram.

If this is done the .02 mfd coupling condenser will naturally connect direct to the grid of the output valve with a 0.5 meg. resistor returning back to earth.

Any of the ordinary output pentodes will serve in the final stage without change to the cathode resistor, but if you use a EL3NG output it will be necessary to reduce the cathode resistor to 150 ohm.

For the power supply the circuit uses the time honored 385 volt power transformer and a loudspeaker with 2500 ohm field coil. Alternatively you could use a 325 volt power transformer and a 1500 ohm loudspeaker field. Or yet again a 225 volt power transformer, 6X5GT rectifier, filter choke and permagnetic loudspeaker.

With an accurately aligned RF stage the receiver should have enough selectivity for most locations, but experiments with the aerial and earth system may pay dividends in improved results.

To obtain the highest selectivity, remember to use the set with the reaction control advanced to just below the point of oscillation, and the gain control set to give the required volume from the loudspeaker. (From R. V. Francis, Box 250, Naracoorte, SA.)

USES "LITTLE JIM'S MATE" ON 10 METRES

WRITING from South Australia, a reader says he has obtained good results from "Little Jim's Mate" on the 10-metre amateur band. He has heard American amateurs at good strength, but Australian stations are not often heard, possibly on account of "skip distance" effects and their limited use on this band.

The coil, wound presumably on a 1in. former, has 3½ turns to the grid winding, spaced to occupy half an inch. The reaction winding is four turns and the aerial primary three turns, the latter being partly interwound with the earthed end of the secondary. The lower end of the primary winding is not earthed in the usual way, but remains open. This reader claims better results this way on most bands.

The aerial in use is 100ft. long and fed to the receiver through a .0001 mfd fixed condenser. No earth wire is employed. (From A. J. Burfield, North-parade, Strathalbyn, SA.)

TRADE REVIEWS AND RELEASES

ANGUS & ROBERTSON'S NEW BOOK ROOM

HUNDREDS of thousands of pounds worth of technical books on every conceivable subject are imported from England and America, and to a lesser extent from the Continent, every year and eventually find their way into research laboratories, universities, technical colleges, &c. Every large industrial undertaking today employs one or more trained librarians to carefully collect and catalogue scientific information culled from these books and journals.

DEMAND FOR TECHNICAL BOOKS

The demand for technical books is even greater today because of the number of ex-service men and women taking up reconstruction courses and hobbies, and partly by the fact that an increasing number of people are wanting books showing how things can be done in the home. Much time and money could be saved if people realised that no matter what the problem, invariably there is a book that will tell and show how it can be solved.

Angus and Robertson Ltd., have opened a newly-enlarged and modernised department which gives technical books their proper place in book buying in Australia. It could be said that this department rivals anything in the world for the complete presentation of practical books, and provides the largest selection of technical books in Australia.

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Under architects, Peddle, Thorp and Walker, the department embodies new features to make book buying a quick and pleasant experience. BGE fluorescent lighting totalling 400 feet, was installed by T. C. Nickson, and gives daylight reading without the unpleasant heat associated with incandescent lights. The Sydney County Council gave valuable technical advice.

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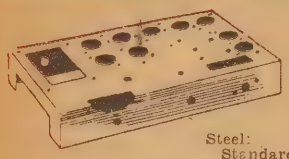

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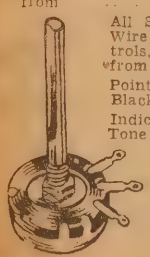

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MANUFACTURED by Wright and Weare, of London, a new line of midget I.F. transformers is now available throughout the radio trade. In a threequarter inch square can, measuring just over one and threequarter inches long, the transformers are ideal for use in midget mantel or portable receivers.

Designed originally for use in small size military equipment, the transformers have been adapted for civilian requirements and are fully tropic proofed.

The windings are totally enclosed in iron dust pots and tuned by fixed condensers. Adjustment to resonance is achieved by varying the position of an iron slug, tiny adjusting screws projecting from each end of the transformer. All supplies of the transformers at present in the country are 460kc. units, but it is planned at a later date to import similar transformers for other frequencies, as supplies become available from the manufacturers.

No price has been fixed at the time this issue goes to press, but it is anticipated that the transformers will retail for slightly more than conventional locally-made units. Supplies are available through most radio supply houses.

CARE WITH TYPE 1S5

A LETTER to hand from Philips Electrical Industries points out that care must be taken to see that other valves of the miniature button-based series are not mistakenly inserted in a socket wired for type 1S5.

QUERY SERVICE

WHEN writing for information through our shilling query service, please write your name and initials carefully or, better still, print your name and address at the head of the correspondence in block letters. Be sure to add the State after the name of your town. Occasionally letters go astray because a signature is misread or they are directed to the wrong State.

In this valve pin 5 connects to the plate, so that the high tension supply is normally wired to the pin through the plate load resistor or transformer. Most other valves in the series have one leg of the filament connected to pin 5, so that insertion of the wrong valve type would complete the high tension circuit through the filament.

The current may or may not be sufficient to damage the filament, but it could discharge the batteries unnecessarily if left in that condition for any lengthy period.

FASTEST PROPELLER-DRIVEN PLANE

This view of the new Flying Wing, gives a good idea of its unorthodox construction. Another view is seen on our front cover.

Chance Vought Aircraft Corporation has announced a radically designed flying wing aircraft, described by the United States Navy as "potentially the fastest propeller-driver aircraft in the world."

THE wing bears no official name, beyond the Navy designation of XF5U-1, or, in the case of the low-powered, full-scale "flying model," the V-173.

At Chance Vought, the flying wing has been developed from a type originally invented in 1933 by Charles H. Zimmerman, now a consulting engineer for the company.

The designation, XF5U-1, means that the craft is at present an experimental Navy fighter.

The low aspect ratio wing of the XF5U-1 serves not only as a lifting surface, but also as a streamline body to house the power plants, fuel tanks, and armament.

PROPELLER LOCATION

The most unusual feature is the unconventional location of the two large-diameter four-bladed propellers, which are mounted on nacelles extending forward from each wing-tip.

The pilot's cockpit, projecting from the centre of the leading edge of the wing, is conventional, but considerable study has been made of the prone position of the pilot, to relieve strain and prevent "blacking out" in violent, high-speed manoeuvres.

Horizontal and vertical stabilising and control surfaces are attached to the aft portion of the wing to provide functions normally performed by the tail surfaces and the ailerons on conventional aircraft.

The landing gear is similar to that of the conventional aircraft, being designed to retract into the airfoil in flight.

Two Pratt and Whitney R-2000-2 engines, mounted within the wing and driving the propellers through a system of gearing and shafting, power the XF5U-1.

ALTERNATIVE DRIVE

The propellers turn at about one-fifth the run of the engine—a further refinement enables either engine, in case of failure of the other, to drive both the propellers.

The propeller blades are made of compressed, impregnated wood, attached to steel shanks.

The control mechanism of the hubs is adapted from and similar to that employed to control the pitch of the new Hamilton Standard Superhydromatic propeller.

The vertical fin and rudder surfaces are similar to and perform the same functions as those of the conventional airplanes.

Twin fins and rudders are used so that they may be in the slipstream at all times, thus retaining their effectiveness at low speeds.

The two horizontal stabilising and control surfaces have been called "ailavators," because they serve both as ailerons and elevators.

They each consist of a single surface which may be rotated on an axis located about a quarter of the distance from the leading to the trailing edge of the surfaces.

The surfaces are rotated together when acting as elevators, and differentially when being used as ailerons.

HIGH SPEED

The XF5U-1 is expected to fly at a speed ranging from 40 to 425 miles an hour, and, with the addition of water injection, from 20 to 465.

A look into the future prompted the estimate that the use of a gas turbine would make possible a speed range from 0 (hovering flight) to over 500 miles an hour, which, the sceptic might say, is nice work if you can get it.

To attain the expected low minimum speed, which would enable the XF5U-1 to get in and out of small fields, the propellers and airfoil are arranged to co-operate to bear the weight of the aircraft down to very low speeds without stalling.

The eventual development of the Zimmerman type is expected to result in the pure hovering flight of a helicopter.

When this is accomplished, it is proposed to provide a landing gear which will make take-offs and landings possible as a helicopter with no ground run.

by *Boris Carone*

ELECTROPULT LAUNCHES AIRCRAFT

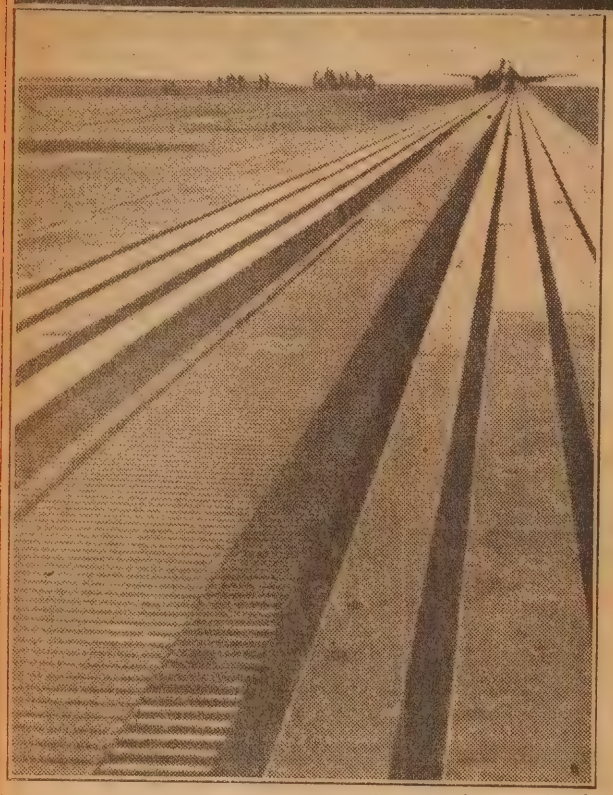

Figure 1. — Linear motor track of the Electropult for assisting aircraft take-off . . . at the Naval Air Test Centre Patuxent River (Maryland). About one-third of the 1382-foot track can be seen. Plane in background is at starting point being readied for launching. The central portion of the track is the core of the Westinghouse 1382-foot long linear induction motor.

Of the many schemes suggested for reducing the length of take-off for aircraft, the one pictured here has at least the advantage of successful trial. Main disadvantage seems to be its fixed position relative to prevailing wind.

A LINEAR electric motor more than a quarter of a mile long is the latest answer to the problem of launching jet-propelled and robot planes and heavy bombers from shipboard or small landing fields without the initial impact of conventional catapults. This new device, called the Electropult, was designed and built by engineers of the Westinghouse Electric Corporation for the United States Navy.

The Electropult is essentially a huge electric motor laid out flat. The 1382ft. track corresponds to the rotor of a conventional machine and the small shuttle car which runs along it acts as the stator. In operation, a plane is hitched to the shuttle car, which speeds down the track and tows the plane into the air. In recent demonstrations at the Naval Air Test Centre, Patuxent River, Maryland, the Electropult launched a jet-propelled plane at 116 miles an hour in four and one-tenth seconds after a run of only 340ft. Unassisted, the plane would have required a run of about 2000 feet for the take-off. Running free, without load, the shuttle car has built up a speed of 226 miles an hour in slightly less than 500 feet.

TWO IN USE

Two Electropults have been built for the Navy, the first installed at Mustin Field, Philadelphia, and the other at the Patuxent River base. The latter is the more advanced model, although both are fundamentally the same. At Patuxent River, the Electropult is installed on a 2800ft. concrete runway, 100ft. wide. The track is mounted flush with this runway above a concrete trench, which contains the copper busbars that carry current to the motor. Sunk into the concrete on both sides of the track are rails to carry the shuttle car.

The shuttle car itself is 11ft. 6in. long, 3ft. 6in. wide, and extends only 5in. above the track. To harness the plane to the car a bridle of steel cable is used. The plane rides along the track on its own wheels, and when flying speed is reached, the car is

(Continued on Page 64).

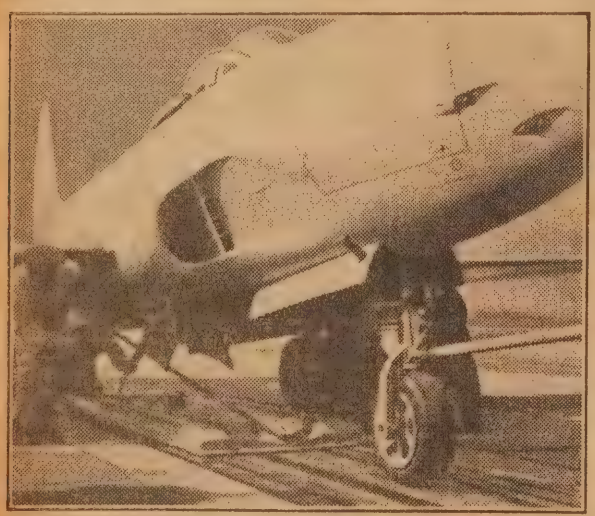

Figure 2.—Naval mechanics ready a jet-propelled plane for launching by the Westinghouse Electropult. The plane is hitched to a small shuttle car by a steel bridle which will tow it down the "track." The plane can be launched at 116 miles an hour after a run of only 340 feet.

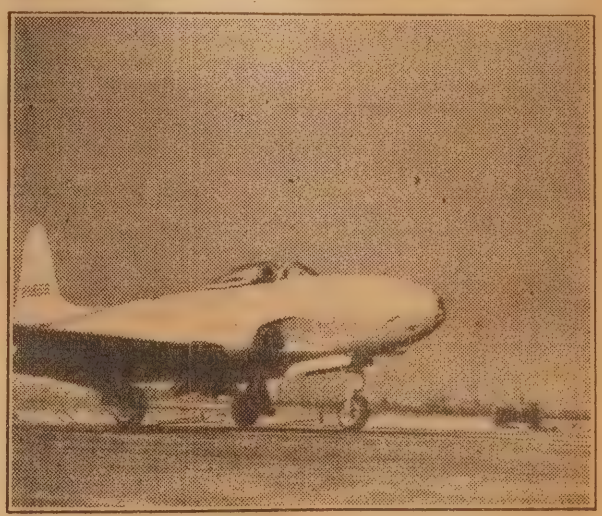

Figure 3.—Here a jet-propelled plane takes off at 116 miles an hour after a run of only 340 feet on the Electropult. Developed by Westinghouse for the Navy, the Electropult is a 1382-foot linear induction motor to aid in launching planes from shipboard or small fields.

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New horizons in air transportation are opened up by the remarkable Consolidated-Vultee Model 37 transport, now under construction. The giant six-engined plane is expected to be test-flown in April. The transport is a mid-wing monoplane, the giant wings placed half-way back along the fuselage.

ALREADY a bomber version of the machine, the XB-36, has been successfully tested in the air. It has a very slender fuselage, with the wing placed high.

This leviathan of the sky has been on the drawing-boards since the later stages of the war. Pan-American Airways announced in 1945 that machines of this type would be placed in service on world airlines as soon as they became available.

The luxury transport version, which is pictured here, will carry 204 passengers from New York to London between breakfast and dinner — about nine hours—according to the designers' claims.

On such long flights, the colossal plane will also carry more than 15,000lb. of luggage and mail. With this full load, the plane will have a range of 4200 miles.

Powered by six 3000-horsepower motors, the Consolidated Model 37 mounts pusher-type propellers, the motors being ranged along the trailing edge of the wing.

The plane has a tricycle undercarriage, landing level and remaining level as it is taxied along the tarmac. Passenger entrances are at both forward and rear ends of the fuselage.

Dimensions of the machine are impressive. The wing spread is 230 feet—nearly twice that of Britain's wartime bomber giant, the Lincoln, and more than half as much again as the famous US Superfortress. The fuselage is 183 feet long, and the tail stands 57 feet high.

Total weight of the plane, loaded, will be 118 tons. Cruising speed is more than 300 miles an hour, but landing speed is only 85 miles an hour.

CARRY 400 TROOPS

The first transport machine of this type is being produced for the US Army, and it has been officially reported that the plane will be able to carry 400 troops. It will be known as the XC-99.

The bomber version, US Army's XB-36, can fly to any part of the world and, "in the event of enemy attacks" (the official phrase), can fly home again without refuelling. Details of defensive armament have not been revealed.

Experts have declared that from bases in the Alaska and Antarctica, planes of this type could be a vital factor in domination of all continents.

THE ELECTROPULT LAUNCHER

(Continued from Page 62).

stopped, the bridle drops off, and the plane takes to the air.

Designs have already been completed for an Electropult capable of launching the largest existing airliners at 120 miles per hour with a take off run of 500ft. Such airliners now need a run of about 4000ft. to accelerate to flying speed. Maximum acceleration would be about one "G," which would be built up during the first two seconds of the take-off run. This means that a passenger would be pressed back into his seat by a force about equal to his own weight.

Other possibilities for the Electropults besides aircraft-carriers are floating airports or seadromes, barge-type airports on city water fronts, mid-city airports, and revival of outgrown airports.

HOW TO MAKE TWO USEFUL LADDERS

Many uses can be found in the house and garden for the two small ladders shown in the accompanying illustrations, and which any handyman should not find difficult to construct. Timber is of course a problem, but the requirements here are not elaborate.

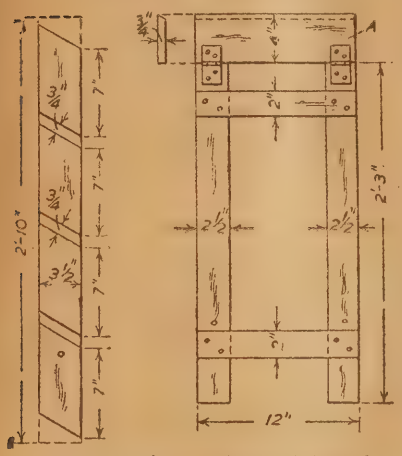


Fig. 2.—Details of sides, and hinged back support.

THE light step-ladder shown in Fig. 1 is particularly handy for odd jobs in the house. There are three treads and a top board, and ordinary planed deal can be used throughout.

MARKING OUT THE SIDES

The first parts to take in hand are the two side pieces, Fig. 2, each of which is shaped from a 2ft. 10in. length of wood 3½in. wide and ¾in. thick. On the side of one piece mark out the slanting lines for the position of the treads. These lines, and those at the top and bottom ends, slope at an angle of 30 degrees, and they can be marked out with the aid of a set square.

With a tenon saw cut through the wood on the three pairs of sloping lines to a depth of ¼in. and, with a chisel, remove the wood between the saw-cuts to form recesses ¼in. deep. Saw off the top and bottom ends, and then mark out and finish the other side piece in the same way, except that the slanting lines must slope the opposite way across the wood.

The treads can be prepared next, and these are sawn from wood ¾in. thick to the dimensions given in Fig. 3. Fix the treads in place with two stout nails driven in through the side pieces, as indicated.

Fig. 3.—Part side view of ladder and details of treads and top board.

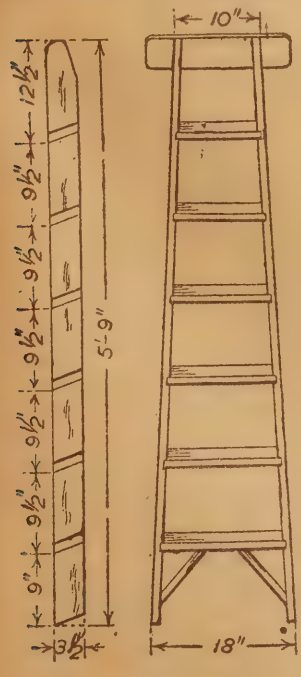


Fig. 5.—Side piece and front view of a 6-step ladder.

HINGED BACK SUPPORT

For the back support of the steps (Fig. 2) two pieces of 2¾in. by ¾in. wood will be required, each 2ft. 3in. long, and to these are screwed the two cross-pieces, which are 2in. wide and ¾in. thick. Make a ¼in. hole in each piece just above the lower crosspiece to allow a piece of rope to pass through.

The part A, which is nailed to the back of the side pieces at the top, is 12in. long and ¾in. thick, and to this part the back support is fixed by two iron hinges, which are screwed in position.

This back part must have the top edge planed

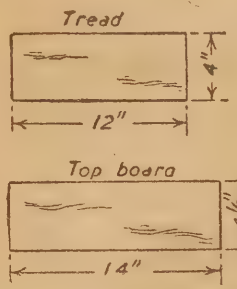
Fig. 4.—The ladder in use.

Fig. 1. — The completed folding step-ladder.

to the same angle as the top of the side pieces.

For the top board (Fig. 3) use wood ¾in. thick and nail this in position so that an equal amount overlaps on each side. To complete the ladder, fix two pieces of strong rope, each about 2ft. long, and knotted at the ends after passing through the holes in the sides and back pieces.

The finished steps can either be painted or the wood can be left bare, as preferred.



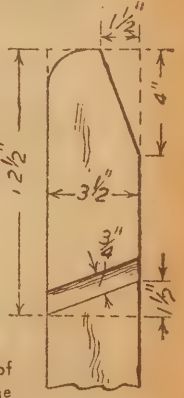


Fig. 6.—Top end of side piece for the longer ladder shown in Fig. 5.

LIGHT GARDEN LADDER

This ladder, which is intended for garden use, can be made throughout with deal 7-8in. thick. Six treads are provided, and also a top cross-rail, which allows the ladder to be placed against the window frame of a greenhouse or other building, as in Fig. 4.

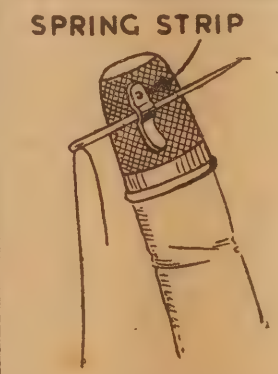
The two side pieces are 5ft. 9in. long and 3½in. wide, and each piece is marked out with sloping lines to the dimensions given in Fig. 5. Note that the lines on one piece slope in the opposite direction to that on the other piece. Each pair of lines should be exactly 7-8in. apart. With a tenon saw and chisel cut recesses ¼in. deep to receive the ends of the treads. Saw the bottom ends of the side pieces to the same angle as the recesses, and then shape the top ends as indicated in Fig. 6.

(Continued at foot of Next Page)

Some Workshop Hints

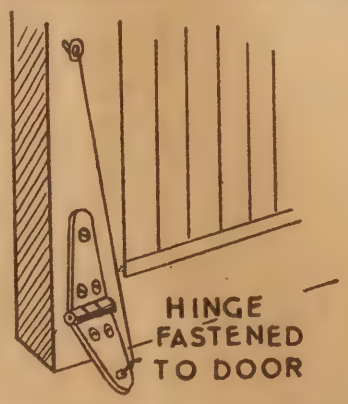
CHEAP ASH TRAY

A boot polish tin with a hole cut in the top and a cigarette holder soldered in place makes a handy ash tray. To clean out the ash simply remove the bottom half of the tin.



NEEDLE HOLDER

A short length of bent spring steel riveted on to an ordinary thimble will provide a handy place to stow the elusive needle.



DOOR STOP

An ideal stop for a garage door can be made by screwing one side of a hinge to the door as shown in sketch. A length of cord fastened to a screw eye and the free side of the hinge permits the release of the hinge closing the door.

TREADS AND CROSS-RAIL

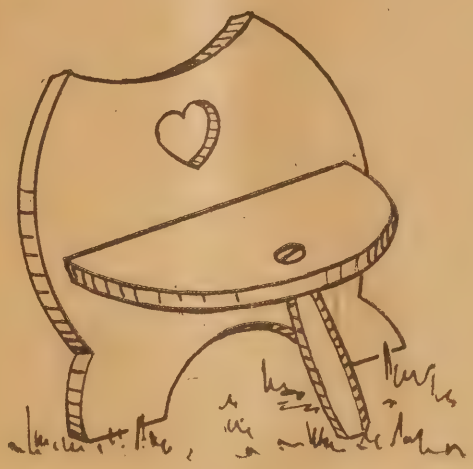
The treads, which are 4in. wide, have to be sawn to different lengths, the bottom one being 15in. long and the top one 10in. long. Each tread is 1in. shorter than the one immediately below it. They are fixed in position by stout nails driven in through the sides. Two nails for each end of the treads will be sufficient. The top and bottom treads should be fixed first.

For the top cross-rail cut a piece of wood 1ft. 6in. long and 4in. wide; round the corners, and screw it to the sloping top ends of the side pieces, as shown.

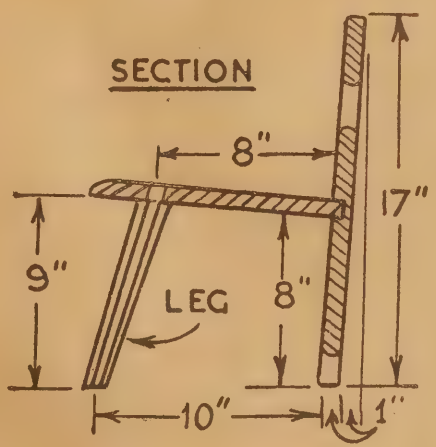
Plane the treads level with the back edges of the side pieces and slightly round off the front edges of the treads.

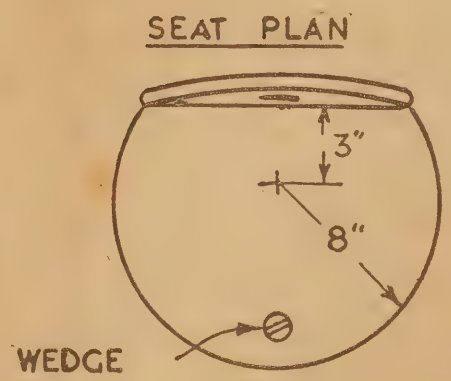
To add to the rigidity of the ladder, screw on two strip iron struts between the ends of the side pieces and the bottom tread, as shown in Fig. 5. These struts are 11in. long, 1in. wide and 1-8in. thick.

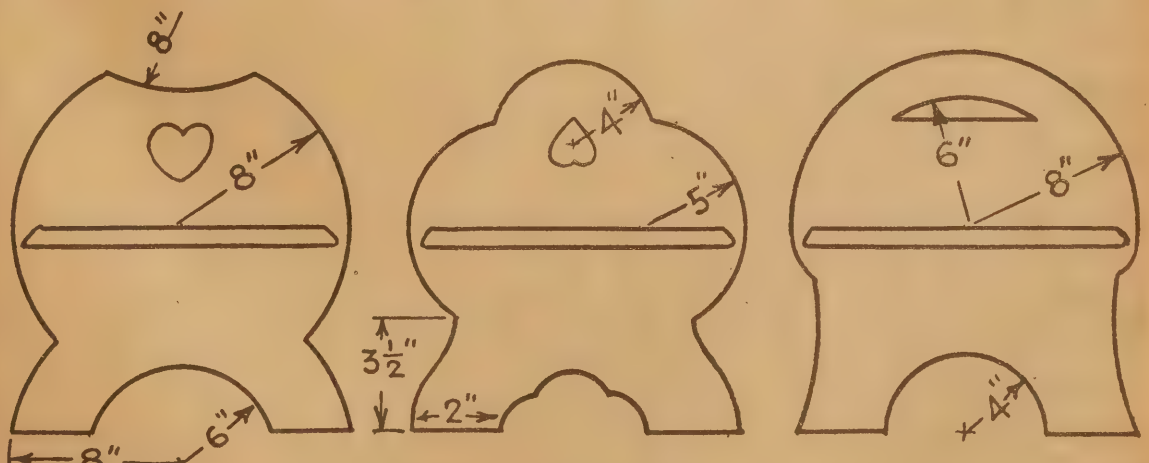
CHILD'S PLAY SEAT FOR THE GARDEN



THE constructional details of the seat are clearly shown in the accompanying drawings. Each seat requires a piece of 1" timber 16" wide and 17" long for the back, and a piece 12" wide and 16" long for the seat. Also a piece of 2" x 2" timber for the leg. The corners are planed from this latter piece of stock to make it into the form of an octagon. Make a round tenon on one end to fit the hole drilled in the seat. The tenon is split lengthwise and a wedge driven in to secure it to the seat. If wide stock is not available a number of narrower pieces can be glued and dowelled together. When completed, paint with bright colors.







3 BACK DESIGNS

THE HAM BANDS WITH BILL MOORE

PHONE AND C.W. BAND DIVISION

One subject that is certain to be fully discussed at the forthcoming Federal Convention of the W.I.A., is that of the restricted use of Telephony and CW in amateur frequency spectrums.

IT is one of the biggest problems confronting amateur radio today, especially with increasing number of licences being granted yearly. It would seem that it is a matter which will have to be solved on an international basis and plans must eventually be co-ordinated by the IARU.

Australia is one of the very few countries in the world where there are no restricted frequencies for telephone and CW use. The best plan seems to be to leave things as they are, for as long as possible, and endeavor to control these problems among ourselves.

We certainly don't want further regulations until they are forced onto us—we have enough to worry about at the moment. Our main CW/telephony problem is that of some line or division that should be observed where CW ends and telephony starts on our 28 and 14 MC bands.

The time will come soon enough when bands are subdivided on an international basis. We pride ourselves on being tolerant—let's practice a little of it and leave at least 100kc. on 28 and 14 MC for the CW gang.

WYONG FIELD DAY

THE first VK2 WIA postwar field day was a great success. Eighty-two Hams YF's. OW's and children attended at the Wyong Golf Club.

The opening event was a Morse test. A record had specially been made, and as a background to the five-letter code groups, the story of a field day with sound effects was run. 2CZ won the event, copying 21 out of a possible 37 groups, 2ZC was second with 20 groups. The story of the field day was well recorded, the singing of "Sweet Adeline" after the celebration was quite impressive. Other prizes were won by 2NP, 1st; and 2ZC, 2nd.

After lunch the search for the hidden transmitter proceeded. The Wyong gang were responsible for the locating and operation of 2WI on 7 MC, 2OC, 2TX, 2RU, 2KB, and company did the job.

For the first time in field day history the transmitter wasn't located even after two hours of operation. Post mortems showed that parties all obtained bearings along similar lines, but none led to the transmitter. They invariably pointed towards some hill, and it appeared that the hills, and there were plenty, caused scattering and reflections of signals, and unless one of the parties had practically stumbled on the transmitter the possibility of obtaining correct bearings was remote.

Prizes for the events were donated by the trade and helped the field day along. Donors were A.W. Valve Co., Philips and Prices Radio.

CONGRATULATIONS to Bill Moore, who recently received a "Mention In Despatches" for his work in Singapore as a RAAF signals officer in 1942. Bill subsequently spent some years as a POW, but has now regained his former impressive stature! He is president of the WIA (NSW Division).

WAC and WBE CERTIFICATES

IN answer to several queries the following information covers the granting of WAC certificates.

In Australia certificates are available to members of the WIA, who submit to their division confirmation of two-way communication with an amateur station in each of the six continental areas of the world.

The required areas are North America, South America, Africa, Europe (including European Russia), Asia (including Asian Russia) and Oceania (Australia, New Zealand, Philippine Islands, the NEI and most Pacific islands). The main islands of Japan are considered as Asia.

The WBE certificate is issued to members of the Radio Society of Great Britain only. It is issued to members who submit to their local representative, cards confirming two-way contacts with five continental areas. (The Americas grouped as one continent). Contacts must be made with British stations in these areas.

W.I.A. NEWS

AN Australian DX Century Club is at the moment being organised by FHQ of the WIA. The club will be open to amateurs who contact and receive cards from 100 different countries listed in Amateur Radio. Lists of members will be published in AR. The commencing date for the club has yet to be announced.

Harry Caldecott, VK2DA is acting traffic manager for NSW, vice VK2VN, at present in USA.

The division of NSW into zones is being proceeded with. At present VK2XQ, R. J. Traill, is zone officer for Newcastle and District, VK2YL, Harry Hawkins, for the coalfields and VK2OJ, Noel Arnold, for the Southern District. It is hoped that the system will afford country members closer contact with the institute's city members.

Results of 1946 VK DX contest should come to hand early next month and a message routed through here confirms that the IARU agrees to a VL-ZL contest for October this year.

The January meeting of the NSW division afforded members an opportunity of suggesting items for the Federal Convention agenda paper. Discussion centred around band sub-division, radio clubs as member clubs and QSL cards. Items will not definitely be formulated until a special meeting to be held in February. Visitors included 3WQ from FHQ, mobile marine 2ANE, from England, VK2AEY, VK2AIP and VK2ADD.

W.I.A. OFFICIAL BROADCASTS

VK3WI, official station of the Victorian division, is very active with services for institute members.

A frequency checking service is available two days a week. Saturdays from 1500 hours to 1700 hours and Tuesday 2000 hours to 2230 hours. 3WI's frequency is 7198kcs, and the accuracy of checks is within .05 per cent.

3WI official broadcasts to members are at 1130 hours on Sundays, and this broadcast is repeated at 2030 hours on Tuesday nights.

3WI is usually operated by VK3ABG, ex 2BP of Hazelbrook.

The South Australian division has commenced a regular broadcast from VK5RR on the 7mc. band at 1000 hours, SA time.

NSW broadcasts continue from 2WI at 1100 hours each Sunday.

These WIA broadcasts have proved of great value during past months with changing bands and disposal gear announcements. Ham radio has made too little use of the air in past years for dissemination of news.

PERSONAL PARS

JACK 2ADT took ham radio away with him on his holidays—QTH, Nelson's Bay—power 3 watts—result WAC on 20 metres.

2HO proved that some types of polestyrene are thermo plastic. One lightning bolt struck the 10-metre rotary and the polestryene rod was moulded into various shaped blobs.

VK2AQJ was the nearest W6JQJ could get to his old Californian callsign.

In Newcastle 2CI has been hearing most of the 6-metre DX on 10 feet of wire.

VR4AA, of Guadalcanal, still active at times on 40 metres, but can't hear any Australians except VK4's. Has spent some time on 20 MX with the Yanks, wasting KW's call them.

Admired by all travellers in trains going west is 2AKR's tower and beams. The 10-metre beam has been lifted. What's the reason Jack, it's not possible that you could get out better on that band surely.

A little late for most people, 2DA keeps weekly skeds at 0100 hours, with 2VN at W6EBG—no misses to date.

2FP with the highest rotary in Newcastle still leads the DX boys in the coal city.

Old timers are mainly making their comebacks on 40 metres. The 1935 crowd is well represented.

2MT, of Wollongong, feels quite strongly on the subject of 20-metre telephony stations wandering down around 14,000kcs.

6MX

THE 6MX band opened up for interstate contacts in the middle of January and all active 6MX stations worked Crosby Walsh, VK7CW.

In Victoria the UHF gang have been unlucky with contacts with VK5 and VK7. VK7CW was audible in Melbourne in contact with VK2LZ, and VK5QR heard 3IZ and 3DA working together, but so far no VK35 or VK37 contacts have been made.

Quite a few VK2's only require VK6 to complete an all-States tally.

SHORT WAVE NOTES BY RAY SIMPSON

NEW TRANSMISSIONS FROM CANADA

COMMENTS ON D.X. COMPETITION

In the near future there will be regular transmissions from Radio Canada over their many short wave outlets directed especially to Australia and New Zealand. Further information regarding these new programmes will be published as soon as we receive details.

IN the meantime we refer readers to our article in this issue in which we give some interesting information which we have recently received direct from the station. We now look forward to the long projected New Zealand short-wave stations when no doubt many reciprocal programmes could be arranged between the two Dominions and Australia.

D.X. COMPETITION

Quite a few readers have written to us approving of our suggestion to hold a DX contest, but as yet we do not have sufficient comment to enable us to draw up the details. Would all listeners who are interested please give their views in their next letters so that we can publish details in an early issue.

Mr. Rex Gillett makes an interesting suggestion as to what form the competition should take. His idea is that it should be similar to one conducted recently by his local radio club. Briefly it is this: The winner of the prize is the listener to log or actually verify the most countries during a previously determined period.

Mr. Gillett managed to log 50 countries in a period of 12 months, so other listeners could perhaps improve on this total. Another possible contest would be a prize to the reader who verified one particular station on the most differing frequencies. As a guide to what is possible, the writer has verified Singapore on 21 different frequencies, admittedly over a number of years.

BCOF STATION VERIFIES

LAST month we gave details of the new BCOF station in Kure, Japan, which has been operating under the call letters WLKS on a frequency of 6105kc.

We have now received a very interesting letter of verification from Sig. M. L. Henderson of the station staff, together with quite an attractive card which has the call letters WLKS, Kure, Japan in large red letters, Royal Crown at top with inscription British Commonwealth Forces beneath and then details of both the broadcast band and short-wave transmitters. At the foot of the card it states: "WLKS wishes to thank you for your report of 6150kc., which has been checked with the station log for that date."

Quoting from Sig. Henderson's letter he says: "You can now add another one to your 'first report' list. Yes, you were the very first to ask for a verification for 6105kc. In fact we have had no other reports of this transmitter from Australia, but quite a few of the ships on their journey to Kure have received us from as far as New Guinea upwards."

WLKS are now operating on another frequency, 2615kc, with a power of 1kw, which is really nearer 1300 watts. Listen for this one, as it is operating from 6 pm till 11.30 pm, and we are sure Sig. Henderson will be interested to have reports on it. We have already heard a station on this frequency, but have not definitely identified it as WLKS yet.

READERS' REPORTS

OUR thanks are due to the following readers who have sent in letters and reports covering their reception during the past month. Mr. J. Saunders, Bondi Beach, NSW; Mr M. Krumbeck, Kogarah, NSW; Mr. J. Fox, Dunedin, NZ; Mr. A. Cushen, Invercargill, NZ; Sig. M. L. Henderson, BCOF Japan; Mr. Ted Whiting, Five Dock, NSW; Mr. T. R. Boyd, Malvern, Vic: Mr. W. Davey, King's Cross, NSW; Mr. F. J. Smedley, Landsborough, Qld.; Mr. Ern. Suffolk, Lobethal, SA; Mr. P. Bvard, Launceston, Tas.; Mr. J. Jensen, Bankstown, NSW; Mr. C. Jones, Gladesville, NSW; Mr H. D. Mortimer, Marrickville, NSW; Mr. A. R. Vincent, Northbridge, NSW; Mr. J. N. Tossen, Turramurra, NSW; Mr. M. McShane, Rozelle, NSW; Mr. W. S. Milne, Invercargill, NZ; Sig. M. L. Henderson, Kure, Japan; Mr. Rex Gillett, Prospect, SA; Mr. N. Armstrong, Burwood, NSW; Mr. R. G. Robins, Turramurra, NSW; Mr. A. Lee, Merewether, NSW; Miss D. Sanderson, Malvern, Vic.

WE are very gratified at the large number of reports received this month, especially those from readers from whom we have not previously heard. Our thanks are due particularly to Messrs. R. G. Robbins, J. N. Tossen, and A. R. Vincent, who in answer to our remarks in last month's issue, sent along details of the United Nations stations which now appear to be regular American stations which have been lent to UNO to carry their programmes. Among the stations used are KNBA on 9490kc., KRHO on 9650kc, and WNRX on 9750kc. The Pacific service is on the air from 5.45 pm to 6.45 pm nightly, except Mondays.

OUR NEW RECEIVER

Since our last issue the writer has been fortunate in obtaining an 18-Tube Hammarlund Super-Pro Receiver, so we should have no excuse now for not hearing anything which is on the air. Even though it has two stages of RF we still have our preselector to boost those very weak signals which would otherwise be inaudible. Audio output is 14 watts, and it of course has all the other aids to make tuning easy and accurate.

NEW STATIONS OF THE MONTH

Call	Kc.	Metres	Location	Time Heard
CR7B	4875	61.54	Lourenco Marques	5.0 am
VQ7LO	4885	61.41	Nairobi, Kenya	5.0 am
MACASSAR	5065	59.23	Macassar, Celebes	11.0 pm
CKRZ	6060	49.50	Montreal, Canada	9.30 am
NOUMEA	6160	48.70	Noumea, New Caledonia	7.0 am
XRAY	8890	33.75	Peiping, China	8.0 pm
MUNICH	9540	31.45	Munich, Germany	7.0 am
KGEI	11790	25.45	San Francisco, Cal.	6.0 pm
XGOA	11830	25.36	Nanking, China	8.0 pm

THE STORY OF THE C.B.C.

WE have recently received a very interesting brochure from the Canadian Broadcasting Corporation giving a great deal of information regarding that organisation. While most of it was of special interest to Canadian listeners, we give below some extracts which we feel will be interesting to readers in this country:

"CBC's radio engineers learned their job the hard way—by doing it. No country in the world has a radio system that presents more problems for the engineer. Vast distances, scattered population, financial resources that are certainly not unlimited. CBC Engineering Division has set up research laboratories and workshops, and many a piece of studio and transmitter equipment has been developed and made by CBC's own technicians. Planning and carrying through the coverage of the Royal Tour in 1939 was one of the biggest and most successful jobs of radio engineering in radio history. CBC developed mobile equipment, making use of standard Army vehicles, for radio reporting from the battlefields of the second World War; their careful planning put the CBC ahead of other networks in bringing to the folks at home a first-hand account of what was happening on the fighting fronts.

"CBC's engineers planned and supervised all the intricate technical arrangements for broadcasting by American and British as well as Canadian commentators, at all of the important International conferences held in Canada during the war and afterwards—the two historic conferences at Quebec, the UNRRA conference and the meeting of the Provisional International Civil Aviation Organisation in Montreal, the meeting of the United Nations Food and Agriculture Organisation in Quebec. The more recent conferences have also been broadcast by the CBC International Service, whose short-wave programmes are heard in Europe with greater strength and clarity than any from this continent—another tribute to the technical skill of CBC engineers."

INTERNATIONAL SERVICE

The CBC operates an International Service, with regular broadcasts by short-wave of news, talks, music and entertainment to listeners in the United Kingdom, Europe, the West Indies, and Central and South America. It is planned to broadcast programmes by short-wave to Australia, New Zealand and South Africa and to a larger list of foreign countries. In its first year of operation, in spite of disorganised postal service in Europe, the International Service has received and answered over 10,000 letters from listeners abroad, which shows the extent to which it is making friendly contacts for Canada in other countries. The operation of this service—the object of which is to develop friendship and understanding of Canada and her people abroad and to promote International goodwill—is paid for by the Canadian people through a direct Government grant. The International Service is not paid for out of the licence fees which the CBC receives from Canadian listeners, all of which go toward paying for programmes heard here in Canada."

The Press and Information Representative of the CBC International Service, Mr. T. C. Fairley, in a very nice letter, confirmed the fact that they will shortly be transmitting regular programmes to Australia and has promised to supply details well in advance Full information will be published in these pages immediately the information is to hand.

Comments on the programmes are invited and we feel sure that readers will now receive their verification cards more promptly than in the past. The new address is Canadian Broadcasting Corp., International Service, PO Box 7000, Montreal, PQ, Canada.

NEW SHORT WAVE LOGGINGS

WE give below a few details of new stations which have been logged during the past month.

GERMANY. In last month's issue we gave details of the new stations which are operating in Munich on 6100kc, 6170kc, and 7290kc, and we now have information concerning another outlet of this station which we have heard at really surprising strength every morning on 9540kc. This new outlet is much the loudest and actually one of the best on the band around 7 am. Listen for it any morning as it can easily be heard until it closes at 7.30 am with the usual announcement, "This is Munich relaying The Voice of the United States of America."

KENYA. One of the oldest stations in Africa, VQ7LO in Nairobi, Kenya Colony, has now been heard on a new frequency of 4885kc instead of its old one of 4950kc. If you can rise early on a Sunday morning you can log it until it closes at 6 am with the usual announcement of "This is Nairobi." We have now verified reception of this station on 6060kc, 6083kc, and 4950kc and have now reported their new outlet on 4885kc. Strangely enough we have never heard the faintest sign of a signal on 10730kc though we listened for it consistently when it was reported on the air. Address for this one is Cable & Wireless Ltd., PO Box 777, Nairobi, Kenya Colony.

NEW CALEDONIA. Radio Noumea, or The Voice of France in the Pacific, has now been heard on a new frequency of 6160kc instead of the previous one of 6208kc. Strength of signal is still very good and popular recordings are heard during the major portion of the programme. While they were on 6208kc, Mr. Smedley, Landsborough, Qld., advised that he had checked their opening and closing times which were as follows, open at 5.30 pm and close at 8 pm or a few minutes earlier. This station is still usually referred to as FK8AA but this is not correct as this was the call of an amateur who left the air many years ago but who did broadcast musical programmes and was the forerunner of the present station.

CHINA. The well-known Nanking station has now been heard on a new frequency of 11830kc where it comes in at very good strength from afound 8 pm. This is the first time we remember hearing Nanking on this band and we have no record of any previous frequency here. Just before we logged XGOA on this new frequency we noticed it back on one of its old frequencies, namely 5910kc, where it was coming in at great strength in parallel with the one on 11830kc. This 5910kc frequency has been used on and off for years now and we verified it back in 1937 or 1938 as far as we can remember. The last verification we received was for 9730kc and was very interesting, being written entirely in Chinese with exception of call and frequency.

UNITED STATES. The only new outlet of any USA stations we have heard at time of writing is KGEI which now operates on 11790 kc from 4.14 pm to 6.45 pm daily. The strength of signals is not particularly good but the call letters and General Electric Co. can be clearly heard on the hour and half hour. KGEI is now also supposed to be on 11730kc from 7 pm till midnight but at time of writing they are still announcing as KGEX, but this may only be a mistake on the announcer's part. Many of the A. T. & T. stations are conducting test programmes but as they do not verify reports listeners are not usually very interested in these transmissions.

MISCELLANEOUS. One of the Lourenco Marques stations has been logged at 5 am, operating on a new frequency of 4875kc. We have no record of the call letters but suggest they may be CR7AA. Strength was quite good when we heard it.

Macassar has been logged on another new frequency, this time 5065kc. We heard it at 11 pm about a week ago but it does not seem to be a regular outlet as yet.

Art Oushen tells us of another new Chinese station, XRAY on 8890kc, which is heard on Tuesday nights from 8 pm onwards in special request session for the Forces. He says Morse is bad on this channel and it certainly was when we listened last Tuesday.

STATION ADDRESSES

HERE are a few more addresses to add to those already published in past issues.

MONTE CARLO.—"Radio Monte Carlo," 16, Bd. Princesse Charlotte, Monte Carlo, Monaco.

HP5H.—Radioemissora HP5H, Apartado 1045, Panama City, Panama.

OAX4H.—"Radio Mundial OAX4H," Apartado 108, Lima, Peru.

ZEA.—Radio Station ZEA, PO Box 792, GPO, Salisbury, Sthn. Rhodesia.

KRHO.—Radio Station KRHO, Central Pacific Operations, PO Box 3740, Honolulu, T.H.

BELGRADE.—"Radio Belgrad," Kneza Milosa, 16/v, Belgrade, Yugoslavia.

KOFA.—Radio Station KOFA, Armed Forces Radio Service, APO 541, c/o Postmaster, New York, USA.

PZH5.—Governments Radio Dienst, Paramaribo, Suriname, DWI.

WRUA-L-S.—World Wide Broadcasting Corporation, Hatjerly Beach, Scituate, Mass., USA.

COCD.—Radioemissora COCD, PO Box 2294, Havana, Cuba.

ESPAGNA.—Radio Nacional d'Espana, Subsecretaria de Educacion Popular, Direccion General de Radiodifusion, Programacion—Jefatura, Madrid, Spain.

STOP PRESS
WLKS NOW ON LATER

THE BCOF station in Kure, Japan, now remains on the air until 8.0 pm instead of 7.0 pm as formerly. When it closed at the latter time it was only just audible at our location, but now it remains on the air for an hour longer it can easily be logged during the last half hour of transmission.

The call letters, frequency and location are clearly given on closing, followed by God Save The King. There should be no difficulty in identifying it if tuned in to this frequency.

KGEA, 9390kc.

On Sunday night, the 9th February, we were surprised to hear a very loud station on 9390kc, conducting a church service very similar to that heard from HCJB.

In the closing announcement given at 10.30 pm, it was learnt that this was a programme entitled "Bringing Christ to the Nations," and was being relayed by over 800 stations. Listeners were invited to write for a "Bringing Christ to the Nations Pin," and should write to the station they were listening to. The final announcement was that it was station KGEA Press Wireless Inc., relaying the programme to XORA. This may turn out to be a regular Sunday night programme.

BBC CALL SIGNS AND FREQUENCIES

49 METRE BAND.

GRB, 6.01 mc; GWA, 6.125 mc; GWS, 6.035 mc; GRW, 6.15 mc; GSA, 6.05 mc; GWK, 6.165 mc; GRR, 6.07 mc; GRO, 6.18 mc; GWM, 6.09 mc; GRN, 6.195 mc; GWL, 6.11 mc.

41 METRE BAND

GRS, 7.075 mc; GSW, 7.23 mc; GRM, 7.12 mc; GWI, 7.25 mc; GRT, 7.15 mc; GSU, 7.26 mc; GRK, 7.185 mc; GWN 7.28 mc; GWL, 7.21 mc; GRJ, 7.32 mc.

31 METRE BAND

GRI, 9.41 mc; GWB, 9.55 mc; GSB, 9.51 mc; GSC, 9.58 mc; GWJ, 9.525 mc; GRY, 9.60 mc; GWO, 9.625 mc; GWT, 9.675 mc; GVZ, 9.64 mc; GRX, 9.69 mc; GWP, 9.66 mc; GRH, 9.825 mc; GRU, 9.915 mc.

25 METRE BAND

GRG, 11.68 mc; CWQ, 11.84 mc; GVW, 11.70 mc; GSE, 11.86 mc; GVV, 11.73 mc; GVX, 11.93 mc; GSD, 11.75 mc; GVY, 11.955 mc; GVU, 11.77 mc; GRV, 12.04 mc; GWH, 11.80 mc; GRF, 12.095 mc; GSN, 11.82 mc.

19 METRE BAND

GWC, 15.07 mc; GWR, 15.30 mc; GWG, 15.11 mc; GSP, 15.31 mc; GSF, 15.14 mc; GWE, 15.435 mc; GSO, 15.18 mc; GRD, 15.450 mc; GSI, 15.26 mc.

16 METRE BAND

GVP, 17.70 mc; GSG, 17.79 mc; GRA, 17.715 mc; GSV, 17.81 mc; GVQ, 17.73 mc; GRQ, 18.025 mc; GVO, 18.08 mc; GRP, 18.13 mc.

13 METRE BAND

GSH, 21.47 mc; GVR, 21.675 mc; GSJ, 21.53 mc; GVS, 21.71 mc; GST, 21.55 mc; GVT, 21.75 mc; GRZ, 21.64 mc.

11 METRE BAND

GSQ, 25.75 mc; GSK, 26.10 mc; GSR, 26.40 mc; GSS, 26.55 mc.

SHORT WAVE Notes for the April issue are due by March 8th. Send them direct to Mr. Ray Simpson, 80 Wilga-street, Concord West, NSW.

FLASHES FROM EVERYWHERE

THIS month we are reproducing a few items heard from the DX session over Radio Australia, which as listeners know, is conducted by Ern Suffolk, of South Australia. All listeners should listen to these sessions, as much interesting information can be obtained, and remember, Mr. Suffolk is anxious to obtain first hand authentic details of any new stations, etc.

BYRD EXPEDITION

The Byrd Expedition, which is at present in the Antarctic, has a transmitter in operation in the USS 'Mt. Olympus" which operates with the call letters NAVE on a frequency of 9288kc, 12240kc, 12260kc, 15930kc, 15960kc, 17820kc, and 17840kc.

The last frequency has been heard both at 9 am and also at 11.30 pm in contact with WBU, when strength was quite fair. The power used is reported to be 2½kw.

HONGKONG. Information has been received from the PMG of Hongkong giving details of the stations now operating in the colony. ZBW3 is now on the air on its old frequency of 9525kc. and English can be heard from 2.30 pm to 3.15 pm, 8.30 pm to 9.30 pm, and 11 pm to 1 am. News sessions are at 3 pm, 9 pm, and 11 pm. The broadcast call letters are ZEK and ZBW. In the old days the address was PO Box 200, Hongkong, so perhaps it is still the same.

HAITI. We were very interested to hear that HH3W is now definitely known to verify reports, as a listener in South Australia and another in New Zealand have received their verifications. Times on the air of this station are 9.30 pm to 11.30 pm, 3 am to 6 am, and 9 am to 1 pm and on Mondays only from 1 am and 6 am. The address is PO Box A117, Port-au-Prince, Haiti, so anyone who has already written is advised to send a follow-up letter. The writer has written about five letters during the past six or seven years, but no verification has turned up as yet, so here's hoping that some of our readers can "ring the bell."

THIS MONTH'S VERIFICATIONS

Mr. A. Cushen, KOFA 7.220kc, XTPA, VLB5, VLA9, Singapore 6770kc, KNBA/I 9650kc, KCBR 11810kc, OAX4Q, Radio Rodina, LKJ, CE622, Dakar 6915kc, Paris 9985, 11845kc, Singapore 11735kc, CE622, FZK6 6915kc, XEBT, OAX4M 6315kc, CSX2 11030kc, VUM2 7260kc.

Mr. J. Saunders, VLA3, VLQ3, VLW3, VLB3, VLG5, VLH4, KWID/X, KGEI.

Mr. R. Gillett, KOFA 7220kc, first report from Australia; ZNB, GSA, GWJ, GVW, CE970, CBFZ, Omdurman, Klofta 6200kc, Capetown 9610kc, CR7B, 9650kc, VUD8 21510kc.

Miss D. Sanderson, Radio Andorra, Leopoldville, CBFZ, SDB2, Warsaw.

Mr. M. Krumbeck, VLA2-4-6, VLB3-9, VLC4, VLG3-5-7-10, VLW7, Algiers, VLG5, VLB, KNBX, KCBR, KCBA, KGEX, KNBA, KWID, KCBF.

Mr. P. Byard, GSB, VLA9, VLB8, VLC10, VLQ3, VLR2, VLW7, Singapore 11735kc, 15300kc, KWID 9570kc, WRUA 15350kc, WNRX 14560kc, CKLX, PCJ 15220kc.

Mr. J. Jensen, VQ7LO, Athens 7290kc, CKRX, KRHO, VUD8 15350kc, WRUA 15350kc, WCBN 9490kc, KWIX 17770kc, VLW3, VLW7, VLA6, VLC2, VLC4, VLG6.

Mr. C. Jones, LKJ, SEAC 6075kc, PCJ 9590kc, Warsaw 6114kc.

Mr W. S. Milne, CKCS, CKCX, CHOL, Luxembourg, Sofia, LKJ, Paris 9520kc, Jaffa 6170kc, 6190kc, WCBN 15270kc, WCRC 11830kc.

Mr. M. McShane, KWID 11900kc, KNBA/I 17780kc, VLB5, VLA9, VLC4, VLG4.

Our Own Listening Post: Busto Arsizio I 9630kc, Busto Arsizio II 11810kc, Asharq al Adna 6135kc, 6710kc, 6790kc, XGOA 9730kc, WRUA 11790kc, 15130kc, WRUS 15130kc, CXA19 11835kc, TGWA 9760kc, WCBN 11830kc, WCRC 21570kc, VUM2 7260kc, VUD2 7290kc, VUD8 21510kc, first report from Australia; VUD10 6100kc, CE622 6220kc, first report from Australia; CBFZ, HER6 15305kc, HBF 18450kc, WOOW 9490kc, 21500kc, WOOC 11870kc, Klofta 6200kc, WBOS 15270kc, WNRX 14560kc, WXLG Kwajalein, NCLG USS Appalachian 9680kc, 10640kc, CKRA, SBP, SBT, HER7 17794kc, KNBA, KNBI 21610kc, KCBA 9750kc, KGEI 17780kc, KCBR 9750kc, KWIX 9750kc, 17760kc, CR7AA 5863kc, CR7BU 4925kc, WLKS 6105kc, first and only report from Australia.

OVERSEAS S.W. STATIONS NOW AUDIBLE

The following stations have actually been heard in this country during the past month and the majority should be audible on a sensitive receiver. All times are Australian Eastern Standard Time.

NORTH AMERICA

13 Metres.

WNRX—21610kc. 13.88m. New York. Not as good as last month but has been heard at 11.0 pm.

KNBA/1—21610kc. 13.88m. Dixon, Cal. The Adventures in Science programme heard at 7.45 am.

16 Metres.

KNBA/1—17770kc. 16.88m. Dixon, Cal. Heard nicely till closing at 11.15 am.

KNBA/1—17780kc. 16.87m. Same location. This pair open again at 11.30 am and improve in strength from then onwards.

KCBF—17850kc. 16.81m. Delano, Cal. The World in Review session is heard well at 11.0 am.

KRHO—17800kc. 16.85m. Honolulu, T.H. Heard from 8.0 am to 8.30 am and also from 11.0 am till 4.0 pm.

WLWK—17800kc. 16.85m. Cincinnati, Ohio. Can only just hear this station at 11.0 pm.

NAVE—17840kc. 16.82m. USS "Mt. Olympus," Antartica. Heard in the morning and also at 11.30 pm.

NAVE—17900kc. 16.75m. Same location. Miss Sanderson has heard this outlet being used at 9.15 am calling New York.

KRO2—17900kc. 16.75m. Another station heard by the same lady and logged at 10.30 am calling San Francisco with music, &c.

19 Metres.

WOOC—15200kc. 19.74m. New York. Rather weak but can be heard opening at 8.30 pm.

WNRE—15280kc. 19.63m. Same location. This station can be logged around 7.30 am.

WNBI—15150kc. 19.80m. Same location. The Latin American programme is carried at 1.0 pm.

WCBN—15270kc. 19.60m. Same location. Listen to the Adventures in Science programme at 7.15 am.

WRUL—15290kc. 19.62m. Boston. Music and Book Reviews heard at 6.45 am and also heard opening again at 8.30 pm.

WRUA/S—15130kc. 19.83m. Same location. This outlet is in parallel with 15290kc. opening at 8.30 pm.

WBOS—15210kc. 19.72m. Same location. Programme directed to Europe heard at 10.15 pm.

WGEA/O—15330kc. 19.57m. Schenectady. Comes in nicely at 7.45 am and also with Marine Band concert at 8.45 pm.

WLWR—15250kc. 19.67m. Cincinnati. Programme to Europe is given by the Crosley station at 11.0 pm.

KGEX—15210kc. 19.72m. Belmont. Opens at 8.0 am and can be logged on and off until closing at 4.0 pm.

KGEI—15130kc. 19.83m. Same location. This one is on from 8.0 am till 10.45 am and then again from 11.0 am till closing at 4 pm.

KNBX—15250kc. 19.67m. Dixon. On the air from 1.15 pm until 6.45 pm at varying strength depending on location.

KWIX—15290kc. 19.62m. San Francisco. The new schedule for this one is 11.15 am till 3.0 pm.

25 Metres.

WOOC—11870kc. 25.30m. New York. Excellent strength at 8.45 am in programme for Europe.

WOOW—11810kc. 25.40m. Same location. Quite a nice signal when it comes on the air at 8.30 pm.

WNBI—11890kc. 25.22m. Same location. The Latin American programme can be heard at 7.0 am.

WNRA—11790kc. 25.45m. Same location. The news in French and then music can be heard at 8.45 am.

WLWS—11710 kc. 25.62m. Cincinnati. Listen for the news in English from this one at 6.15 am.

WRUL—11730kc. 25.57m. Boston. Cross Section and America Speaks heard at 7.0 am.

WLWO—11710kc. 25.62m. Cincinnati. The Latin American programme comes in at fair strength at 11.15 am. Also heard 10.30 pm.

WCRC—11830kc. 25.30m. New York. On some mornings this CBS station is quite good at 7.0 am.

KCBR—11810kc. 25.40m. Delano. The schedule for this one is 1.15 pm to 4.45 pm.

KGEI—11790kc. 25.45m. San Francisco. This is a new outlet for this GE station. On from 4.14 pm till 6.45 pm.

KGEI—11730kc. 25.57m. Same location. Good level for this outlet from 7.0 pm till midnight.

KGEX—11730kc. 25.57m. San Francisco. On the air daily from 4.15 pm till 7.0 pm at good strength.

KWID—11900kc. 25.18m. Same location. One of the best again from 5.0 pm till closing at 9.30 pm.

KWIX—11890kc. 25.22m. Same location. This outlet is scheduled from 3.15 pm till midnight.

31 Metres.

WLWK—9590kc. 31.28m. Cincinnati. Quite a nice station at 7.30 am and uses English and French.

WLWL—9700kc. 30.93m. Same location. Strong signals from this Crosley station at 6.30 am.

WRUA/S—9570kc. 31.35m. Boston. News in French and music at 8.0 am but not particularly loud.

WNRX—9750kc. 30.78m. New York. An excellent station at 7.0 am and one of the loudest on the band.

WCBX—9490kc. 31.61m. Same location. Another very good station and comes in best at 6.30 am.

WGEO—9530kc. 31.48m. Schenectady. Comes in nicely at some places at 7.30 am with news in Europe.

WOOW—9490kc. 31.61m. New York. Opens with this call sign daily at 8.15 am, but soon weakens in strength.

KNBI—9490kc. 31.61m. Dixon. Excellent signals from this one from around 8.0 pm.

KCBA/F—9750kc. 30.78m. Delano. On the air from 3.0 pm to 6.35 pm and again from 7.0 pm till midnight.

KCBR—9700kc. 30.93m. Delano. This is an excellent station every day from 5.0 pm till midnight.

KWID—9570kc. 31.35m. San Francisco. The schedule for this one is 1.15 pm till 4.45 pm.

49 Metres.

KNBA—6060kc. 49.46m. Dixon. A really excellent station when it opens at 7.0 pm.

WRUA/S—6040kc. 49.67m. Boston. Has not improved in strength and sometimes is inaudible closing at 3.0 pm.

Between Band Stations.

WNRI—13050kc. 22.99m. New York. Quite a good signal at 7.0 am but better around 11.0 pm.

CENTRAL AMERICA

HOXA. 15100kc. 19.87m. Panama City, Panama. Still coming in very nicely at 7 am.

HP5J. 9607kc. 31.23m. Same location. Has been heard on a few nights at 10.0 pm.

HP5A. 11690kc. 25.65m. Same location. The news in Spanish and music are heard at 11 pm.

HHCM. 6160kc. 48.06m. Port-au-Prince, Haiti. Opens at 9.35 pm and can be identified by French announcements.

HH3W. 10130kc. 29.62m. Same location. Another Haiti station which can be heard regularly at 9.45 pm. This one now verifies.

TGWA. 15170kc. 19.78m. Guatemala City. Guatemala. Listen for this Central American opening at midnight.

TIPG. 9615kc. 31.19m. San Jose, Costa Rica. On some nights this old timer can be logged at 11 o'clock.

COBC. 9360kc. 32.04m. Havana, Cuba. Musical programme can be heard at 8.15 am.

COKG. 8950kc. 33.50m. Same location. On the air every night and one of the most reliable Cubans at our post.

COHI. 6540kc. 48.47m. Santa Clara, Cuba. Usually troubled by Morse, but can be heard around 11 pm.

CANADA

CKNC—17820kc. 16.84m. Montreal. On the air from midnight till 6.0 am and opens at 10.0 pm on Sundays.

CKCX—15190kc. 19.75m. Same location. This one is on from midnight till 3.0 am and also opens 10.0 pm Sundays.

CKCS—15320kc. 19.58m. Same location. Opens at 3.05 am and closes at 7.30 am, when it is just audible.

CHOL—11720kc. 25.60m. Same location. The loudest Canadian here and is on from 6.15 am till 9.05 am.

CKLO—9630kc. 31.15m. Same location. Can be heard at 8.0 am and is on from 7.45 am till closing at 9.05 am.

CKRA—11760kc. 25.51m. Same location. This outlet carries the Caribbean programme, opening at 9.20 am.

CKRZ—6060kc. 49.46m. Same location. This outlet was also used for a while in the Caribbean service, but is off the air now.

CFRX—6070kc. 49.42m. Toronto. Varies in strength at different locations, but has been heard as early as 9.0 pm recently.

CBRX—6160kc—48.70m. Vancouver. Still being heard on some occasions at 1.0 am at surprisingly good strength.

MEXICO

XEWW—9500kc. 31.58m. Mexico City. Still the best Mexican and heard very well at midnight.

XFQQ 9680kc. 30.99m. Same location. Not quite so good, but can be logged on a favorable night.

XERQ 9615kc. 31.12m. Same location. Reaches good strength at 3.30 in the afternoons.

XEBT—9625kc. 31.17m. Same location. Another Mexican which can often be heard in the afternoons.

XDY—9924kc. 30.23m. Chapultepec. Comes on the air just before 1.0 am and closes at 1.20 am.

SOUTH AMERICA

PRL7. 9720kc. 20.86m. Rio de Janeiro, Brazil. Has improved very much and can now easily be heard at good strength at 7.0 am.

ZPA5. 11950kc. 25.10m. Encarnacion, Paraguay. Again being heard around 11 pm at fair strength and sometimes also at 7.0 am.

CXA19. 11835kc. 25.35m. Montevideo, Uruguay. Not as loud as a few weeks ago, but has been heard sometimes at 8.0 am.

HCJB. 12450kc. 24.11m. Quito, Equador. Listen for this one in the mornings at breakfast time and also at night at 11.

HCJB. 15115kc. 19.85m. Same location. This outlet is the best at our location and comes in nicely at 7 am.

CE1174. 11740kc. 25.55m. Santiago, Chile. Has again been heard on some nights mixed with the Russian around 10.0 pm.

CE1190. 11900kc. 25.21m. Valdivia, Chile. Can be heard on most nights after the American station closes at 9.30 pm.

CE1180. 11990kc. 25.02m. Santiago, Chile. One of the best of the Chile stations and often heard well at 10.0 pm.

PRL9. 17850kc. 16.81m. Rio de Janeiro. This one has been heard in a test programme at 10.30 pm.

YV5RN. 4915kc. 61.04m. Caracas, Venezuela. Opens at quite good strength at 8.25 pm and easily identified.

INDIA AND ASIA

XGOA. 9730kc. 30.82m. Nanking, China. Much better than it was a few weeks ago, and easily heard at 10.0 pm.

XGOA. 11830kc. 25.36m. Same location. This is the new outlet and has been heard at excellent strength at 8.30 pm.

XGOA. 5910kc. 50.76m. Same location. This is the correct call for the one we reported last month as XGOY.

XORA. 11690kc. 25.66m. Shanghai. The news and music can be tuned in at good strength from about 8.45 pm.

XMTA. 12210kc. 24.56m. One of the loudest Chinese stations and comes on nightly at 8.

XGOE. 9820kc. 30.56m. Reported by Miss Sanderson as heard at 9.45 pm. We have heard the station but no call as yet.

XRAY. 8890kc. 33.75m. Peiping. New station first reported by Art Cushen and Miss Sanderson. Heard at 8 pm in AFRS.

XNCR. 7580kc. 39.58m. Yunnan. Another new one from Art Cushen, who states call can be heard at 9.15 pm.

ZBW3. 9525kc. 31.49m. Honekong. Rather hard to hear, but with careful tuning the BBC news relay can be logged at 9 pm.

PLP. 11040kc. 27.27m. Java. An excellent programme from this Indonesian station nightly.

PLY. 10060kc. 29.79m. Java. This station also comes in very well and the quality is really excellent.

Macassar. 9360kc. 32.00. Celebes. Musical numbers and news in Dutch every night around 10 pm.

SEAC. 6075kc. 49.38m. Colombo, Ceylon. Not as loud as formerly, but can still be heard nightly.

SEAC. 7185kc. 41.75m. Same location. Listen for this one on Monday from 4.30 am till closing, 6.30 am.

SEAC. 11770kc. 25.49m. Same location. Carries the Indian type programme from 8 pm to 10 pm.

SEAC. 15120kc. 19.84m. Same location. This is the best outlet and is good at most locations at 7 pm.

SEAC. 17770kc. 16.88m. Same location. Indian type programme and English heard at 7 pm.

SEAC. 21470kc. 13.97m. Same location. Cricket relay from Radio Australia heard at 6 pm.

Singapore. 6770kc. 44.31m. Malaya. The news in English can be heard at 10 pm at fair strength.

Singapore. 11735kc. 25.56m. The news in Dutch and then music from this outlet at 8 pm.

Singapore. 15275kc. 19.64m. This is another outlet which comes in well at 7.30 pm and also on 15300kc.

KZRH. 9640kc. 31.10m. Manila, Philippine Islands. Very good now and easily logged nightly.

KZPI. 9710kc. 30.90m. Same location. This one can be heard at 6.30 am and also at better strength at night.

Rangoon. 6040kc. 49.67m. Burma. Not interesting, but a regular one on the band at night.

Saigon. 4810kc. 62.37m. French Indo China. Still being heard on this frequency, but quite a lot of noise with it.

Saigon. 11780kc. 25.47m. Same location. This outlet is much better and English can be heard at 8 pm.

Macau. 9235kc. 32.49m. Portuguese China. Call letters are CR8AA, and station can be heard through heavy Morse at 11 pm.

HS8PD. 5990kc. 50.08m. Bangkok, Siam. Not very good, but can be logged through the hash at 10 pm.

Tokio. 4950kc. 60.61m. Japan. Quite a loud station nightly, and easily identified.

VUD8. 21510kc. 13.95m. Delhi, India. Heard best in the late afternoons, but also at night.

VUD8. 7210kc. 41.61m. When the noise level is not too bad, the news in English can be followed at 12.30 am.

VUD10. 17830kc. 16.82m. On the air in the forenoons, when it reaches good strength.

VUD11. 7290kc. 41.15m. Usually reaches its peak about midnight and easily identified.

VUM2. 7270kc. 41.25m. Madras, India. The news in English can be heard most nights at 10.30.

WLKS. 6105kc. 49.14m. Kure, Japan. This BCOF station has again been heard till closing at 7 pm.

FXE. 8030kc. 37.52m. Beirut, Syria. You can log this station just after 5 am when programme in French is heard.

AFRICA

Tananarive—6065kc. 49.46m. Madagascar. Quite a good station at 2.0 am.

Tananarive—9395kc. 30.96m. This outlet is the best at our location and the station is easily identified at 2.0 am.

Algiers—6040kc. 49.66m. Algeria. Still being heard at 7.0, but not particularly loud.

Radio Algerie—11835kc. 25.35m. Algeria. Still very loud on most afternoons opening at 4.30 pm.

Addis Ababa—15070kc. 19.91m. Ethiopia. Have only heard this one on two occasions closing at 1.0 am.

VQ7LO—4885kc. 61.41m. Nairobi, Kenya. Heard quite well on this new frequency till closing 6.0 am on Monday.

CNR3—9080kc. 33.04m. Rabat, Morocco. Comes in at some places around 4.30 pm, but rather weak.

CNR—16660kc. 18.01m. Only weak but can often be found at 11.0 pm.

No. 3—5883kc. 51.0m. Capetown, South Africa. Still the only SABC station heard and only weak closing at 7.0 am.

ZNB—5900kc. 50.85m. Mafeking British Bechuanaland. If you get up early you can log this one at 4.0 am.

SUV—10050kc. 29.84m. Cairo, Egypt. Cannot log it at our post but reported by others as heard at 3.30 am.

Dakar—15390kc. 19.49m. Senegal. Still being heard nicely at 7.0 am and closes 7.30 am or sometimes 8.0 am.

CR7AA—5863kc. 51.10m. Lourenco Marques, Mozambique. Not nearly as good as a few months ago but sometimes heard at 4.30 am.

CR7BJ—9650kc. 31.09m. Same location. Nice loud signal on most days round 6.0 am.

CR7AA—6135kc. 48.90m. Same location. Another outlet which has been logged as late as 6.30 am.

FZL—6025kc. 49.80m. Brazzaville, French Equatorial Africa. An early morning station and heard best at 5.0 am.

FZ1—7000kc. 42.86m. Same location. New outlet reported by Rex Gillett; heard in English at 6.45 am with news.

FZ1—9980kc. 30.06m. Same location. Quite a good station daily at 6.30 am.

FZ1—11970kc. 25.05m. Same location. The best outlet at our post and news easily heard at 6.45 am.

FZ1—17530kc. 17.11 m. Same location. Heard by Miss Sanderson with news in French at 4.0 pm.

OTM3—9370kc. 31.98m. Leopoldville, Belgian Congo. Very good station at 7.0 am with music and French talks.

OTC2—9740kc. 30.80m. Same location. Strong signal but hard to separate from the American on 9750kc.

OTC1—17770kc. 16.88m. Same location. Can still be heard at 11.0 pm- but not particularly good at our location.

EUROPE

Athens. 7295kc. 41.12m. Greece. Very hard to separate, but by careful tuning you can hear the news in English at 6.15 am.

Andorra. 5980kc. 50.02m. Not as good as formerly, but is still audible on most mornings.

Madrid. 9370kc. 32.0m. Spain. Still being heard around 7 am, but not particularly loud.

Berlin. 9730kc. 30.83m. Germany. The best time to hear this station is around 6 am.

Brussels, 17840kc. 16.82m. Belgium, Coming in nicely now at our post till closing at 10.30 pm.

Luxembourg. 6090kc. 49.26m. Very poor at 6 am as it is smothered by the noise on this portion of the band.

Warsaw. 6115kc. 49.06m. Another European which is hard to log due to the high noise level.

Sofia. 9350kc. 32.09m. Bulgaria. "Radio Rodina" can still be logged on a good morning at 6.30 am.

Milan. 9630kc. 31.15m. Italy. This one can usually be logged at fair level around 6.30 am, when conditions are good.

Paris. 15240kc. 19.69m. France. One of the best on the band and heard at great strength at midnight.

Paris. 15350kc. 19.54m. Another French station which is used in parallel and also good level.

Paris, 9520kc. 31.51m. The best time for this one is around 7 am, when it is really good.

PCJ. 9590kc. 31.28m. Hilversum, Holland. Special programme to Australia and Pacific on Tuesdays from 6 pm to 7.30 pm. Mr. Krumbeck brought this to our notice as we had missed it.

PCJ2. 15220kc. 19.71m. Same location. Comes in nicely at about 11 pm and call is given in English.

PCJ. 17770kc. 16.88m. Same location. This outlet is used in parallel with the one in the 19-metre band.

PHI. 6023kc. 49.82m. Same location. Have only heard this one with difficulty at 6.30 am as there is interference.

OLR4A. 11840kc. 25.34m. Prague, Czechoslovakia. Still being heard at about 6.30 am, but not very loud.

OLR5C. 15160kc. 19.79m. Same location. The only time this one has been reported is at 1 am when we hear it opening.

HVJ. 5970kc. 50.27m. Vatican City. Quite nice level at 6 am, with talk in English.

HVJ. 6190kc. 48.47m. Same location. Excellent strength at 6 am in parallel with 5970kc. English talk, then talk in French.

HVJ. 9660kc. 31.06m. Same location. Have heard this one opening at 4.30 am when it was easily followed.

HVJ. 15095kc. 19.87m. Same location. You can hear English at 1 am, though strength is weaker than last month.

TAP. 9465kc. 31.70m. Ankara, Turkey. One of the loudest 31-metre band stations at 6.30 am.

LKJ. 9540kc. 31.45m. Oslo, Norway. Still being heard every night when it opens at 8.45 pm.

LLI. 6185kc. 48.51m. Same location. Coming in fairly well when it is logged at 6.30 am.

Munich. 6170kc. 48.62m. Germany. This AFRS station is heard well from around 5 am and still audible at 7 am.

Munich, 7290kc. 41.15m. Another outlet in parallel, and if anything, is slightly better.

Munich. 9540kc. 31.45m. This is definitely the best outlet and can be followed well till it closes at 7.30 am.

HER5. 11865kc. 25.28m. Schwarzenbourg, Switzerland. Excellent on Tuesdays and Saturdays in Australian session. Opens 5 pm.

HE15. 11715kc. 25.61m. Same location. Used in parallel with 11865kc. and nearly as loud at the same time.

HER7. 17784kc. 16.87m. Listen for this Swiss station on Mondays, when special session opens at 6 pm.

HER6. 15305kc. 19.60m. Have logged this 19-metre band outlet when it opens at 1 am with programme for Africa.

HER4. 9535kc. 31.47m. Only time logged is 7 am and it was very weak then.

HEK3. 7280kc. 40.65m. Miss Sanderson has heard this one at 6 am with the news in French.

CSW7. 11040kc. 27.27m. Lisbon, Portugal. The news in French can be heard at 6.15 am.

EPB. 15100kc. 19.86m. Teheran, Iran. Try for this one at 9.30 pm when the news is given in French.

SDB2. 10780kc. 27.83m. Motala, Sweden. Very good station at 6 am and still audible at 6.30 am.

SBP. 11705kc. 25.63m. Same location. Have only heard this one at the weekends at 5 pm and again at 10.30 pm.

AUSTRALIA AND OCEANIA

VLA4—11770kc. 25.49m. Shepparton. 7.15 am to 9.0 am, to Forces and British Isles, 5.0 pm to 6.15 pm Saturday only, to British Isles.

VLA6—15200kc. 19.74m. 6.45 pm to 9.30 pm to Forces.

VLA8—11760kc. 25.51m. 1.0 am to 1.30 am British Isles, 2.0 am to 3.0 am North America, also 2.45 pm to 3.45 pm, 11.0 pm to 11.35 pm to Indo-China, 6.55 pm to 11.0 pm and 11.35 pm to 1.0 am Asia and Forces.

VLA9—21600kc. 13.88m. Noon to 2.0 pm Forces, 5.0 pm to 6.15 pm British Isles, 9.30 am to 10.30 am N. America.

VLB—9540kc. 31.45m. Shepparton. 11.0 pm to 12.15 am N. America.

VLB3—11770kc. 25.49m. 5.0 pm to 6.15 pm except Sats. British Isles.

VLB5—21540kc. 13.93m. Noon to 2.0 pm Forces, 1.15 pm to 5.29 pm Sats. only, Sports session.

VLB6—15200kc. 19.74m. 7.15 am to 9.30 am Forces.

VLB8—21600kc. 13.89m. 6.30 pm to 10 pm Forces, also 10.0 pm to 11.0 pm, 6.55 pm to 11.0 pm Asia.

VLB9—96151kc. 31.2m. Midnight to 1.0 am Forces, 1.0 am to 2.0 am British Isles, 2.45 pm to 3.45 pm N. America.

VLC4—15320kc. 19.59m. Shepparton. 8.0 pm to 11.0 pm and midnight to 1.0 am to Forces and Asia, 6.55 pm to 8.0 pm to Forces, 4.0 pm to 4.45 pm to Tahiti, 5.30 pm to 6.45 pm except Sats. to N. Caledonia.

VLC6—9615kc. 31.2m. 2.0 am to 3.0 am N. America.

VLC7—11840kc. 25.35m. 11.0 pm to 12.15 am N. America.

VLC9—17840kc. 16.82m. 11.0 am to 1.0 pm Forces, 2.45 pm to 3.45 pm Africa.

VLC10—21600kc. 13.84m. 6.15 am to 8.30 am Forces, 5.0 pm to 6.15 pm Sats. only, British Isles.

VLG3—117101kc. 25.62m. Lyndhurst. 4.0 pm to 4.45 pm Tahiti.

VLG4—11840kc. 25.35m. 2.0 am to 3.0 am South Africa.

VLG5—11880kc. 25.25m. 11.0 am to 1.0 pm Forces, except. Sats.

VLG7—15160kc. 19.79m. 11.0 am to 1.0 pm Forces, Sats. only, 12.15 pm to 4.29 pm Forces, Sats. only, 2.45 pm to 3.45 pm N. America, 5.30 pm to 6.45 pm N. Caledonia. National programme 6.0 am to 8.0 am week days, 6.45 am to 8.15 am Sundays.

VLG9—11900kc. 25.21m. 10.0 pm to 1.0 am Forces & Asia, 1.0 am to 2.0 am British Isles.

VLG10—11760kc. 25.51m. 5.55 pm to 7.0 pm Forces, 6.55 pm to 12.15 am Asia & Indonesia.

VLH3—9580kc. 31.32m. National programme 6.45 pm to midnight week days and Sundays.

VLH4—11880kc. 25.25m. National programme. 6.0 am to 8.15 am week days, 6.45 am to 8.15 am Sundays.

VLH5—15230kc. 19.69m. National programme. 8.30 am to 6.30 pm week days and Sundays.

VLR—9540kc. 31.45m. National programme. 9.15 am to 6.15 pm week days and Sundays.

VLR2—6150kc. 48.78m. National programme. 6.0 am to 9.0 am and 6.28 pm to midnight week days and Sundays (Sundays open 6.45 am).

VLQ—7240kc. 41.44m. Brisbane. National programme. 6.0 am to 10.0 am week days, 6.45 am to 10.30 am Sundays.

VLQ2—7215kc. 41.58m. National programme. 6.28 pm to midnight week days and Sundays.

VLQ3—9660kc. 31.06m. National programme. 10.15 am to 6.15 pm week days, 10.50 am to 6.15 pm Sundays.

VLW3—11830kc. 25.36m. Perth. National programme. 10.30 am to 6.0 pm week days and Sundays.

VLW7—9520kc. 31.51m. National programme. 6.0 am to 10.15 am and 6.15 pm to midnight week days, 6.45 am to 10.15 am and 6.15 am to midnight Sundays.

Noumea—6160kc. 48.70m. New Caledonia. Heard at good strength on this new frequency from 5.30 pm to 8.0 pm.

Suva—6170kc. 48.62m. This weather station has been heard on some nights at great strength around 9.0 pm.

OFF THE RECORD — NEWS & REVIEWS

Not for a long time have I listened to a recording which has so fascinated me as the Britten "Serenade" released this month. Here we have something which combines genuine musical worth, novelty, and a new type of recording which helps considerably in making it an outstanding success.

SERENADE FOR TENOR, HORN, AND STRINGS (Benjamin Britten) — PETER PEARS—tenor, AUBREY BRAIN—Horn, and the BOYD NEEL STRING ORCHESTRA. Decca Z864-6.

This is an extraordinary release in many ways. Against the background of "classical" releases—none the less welcome for that, of course—it comes as a breath from the new world.

Benjamin Britten, one of the most important of English moderns, has appeared in previous lists in work which has demanded attention.

This Serenade is written for two soloists—horn and tenor voice—and Aubrey Brain and Peter Pears in particular. The combination is somewhat startling at first sight, but the effectiveness is demonstrated as the music unfolds.

Many of the words are well known. The Nocturne is Tennyson's "The Splendour falls from the Castle Walls" and the sonnet is Keats' "Sonnet to Sleep." The composer has aimed to fit music to words at all costs, and even if some of the difficulties are almost too great, he has made a remarkable effort.

Concerning the music, one feels that our allotted space is somewhat inadequate, the more so because it merits considerable digestion, and I have only had the records a few days. But it is brilliantly done, full of imagination, and showing great skill in the creation of mood, light, shade and in the mastery of a difficult combination. There are passages of great beauty, particularly in the Keats' sonnet, and some positively frightening effects as in the Elegy and Dirge, where the choice of the horn becomes so abundantly justified.

BRAIN THE STAR

Of the soloists, Brain, in my opinion, is the star. He achieves a marvellous range of tone color and expression, using the immense resources of the horn to great advantage. No greater contrast, for instance, could be found between passages in the Dirge, and the lovely, "elfland" sustained notes of the short epilogue. He expresses joy, rapture, and the macabre with equal force. What a lesson in demonstration for horn players!

The tenor is a typical English singer, not in the least like the Europeans or Italians. Whether you think this is a good thing is a matter of opinion. He displays great flexibility and control, and understanding of the composer's mind. Although he shows a tendency to "crowd the mike"—and anyone who does that must have perfection to display—his performance leaves plenty of room for approval.

A further point worthy of mention is that this is, without doubt, an FFRR set, with a frequency range apparently extended more in the higher region than in the low. Its definition is at times startling, and if you have a good reproducing outfit, you are in for a shock. Altogether I must confess that these records jarred me completely from the complacency which at times, settles on all reviewers. In their way, they are quite a land mark.

"THE WALK TO THE PARADISE GARDENS" from "A VILLAGE ROMEO AND JULIET" (Delius), played by the HALLE ORCHESTRA under JOHN BARBIROLLI. HMV. EB359.

Last month I missed this fine recording through lack of space. One of the of Delius' smaller works, it is favorite with audiences and also with me. That may be why I cannot credit it with complete perfection, although the opening bars, particularly, are beautifully played.

Unfortunately, there is a hint of roughness here and there which make it best as a thorn-needle proposition. Somehow you can't beat the Beecham touch in Delius, but don't let that dissuade you. Both orchestra and conductor know their jobs.

NORWEGIAN DANCES OPUS 35 (Grieg) played by THE CITY OF BIRMINGHAM ORCHESTRA conducted by GEORGE WELDON. Columbia DOX 820-1.

These dances of Grieg are a terrific contrast to the music of Britten. The master of miniature has achieved some of his best in his Suites—Peer Gynt, the Lyric, and Holberg, perhaps the loveliest of all.

These dances will delight any lover of music as such. They have all the simplicity, delicacy and fire, that go to make up Grieg himself.

The orchestra acquits itself admirably in every way. Its work has understanding, ability, and above all, finish. The records would do credit to a much more famous name and conductor.

Other Recent Releases

REGAL-ZONOPHONE

KNIGHT BARNETT (At the Wurlitzer Organ)—SONGS BY AUSTRALIAN COMPOSERS, No. 1—(May Brahe)—Intro.: Listen Mary; Bless This House; Spring is on the Way. SONGS BY AUSTRALIAN COMPOSERS, No. 2 (May Brahe)—Intro.: Close Thine Eyes; Evening Shadows; Keep Thou My Heart. G. 25079.

SONGS BY AUSTRALIAN COMPOSERS, No. 3 (Alfred Hill) —Intro.: Pro Patria Australia. A Maori Lullaby; Waiata Poi. SONGS BY AUSTRALIAN COMPOSERS, No. 4. (A. Emmet Adams)—Intro.: Life's Great Sunset; God Send You Back to Me; The Bells of St. Mary's. G. 25080.

SONGS BY AUSTRALIAN COMPOSERS, No. 5. (Henry Krips)—Intro.: Shall I be Weary; One Son is in My Heart. SONGS BY AUSTRALIAN COMPOSERS, No. 6 (Fred Whaite)—Intro.: Where the Mountains go Down to the Sea; I'm Dreaming Again of Castles in Spain. G. 25081.

DECCA

SPIKE HUGHES AND HIS NEGRO ORCHESTRA—Hot Jazz Classic, No. 2—"How Come you do me like you do," and "Sweet Sue, Just You." Henry Allen (Tpt.); Dickie Wells (Tmb.); Benny Carter, Wayman Carver, Leon Berry, Coleman Hawkins (Reeds); Rodriguez (Pno.); Lawrence Lucie (Gtr.); Sidned Catlett (Dms.); Spike Hughes (Bass.); Recorded 1933. Y. 5992.

MARION HUTTON WITH ORCHESTRA—"No More Toujours L'amour," and "I Fall in Love With You Every Day" (Connee Boswell and the Paulette sister). Y. 5991.

THE MERRY-MACS—Vocal with Orchestra—"Ashby De La Zouch," and "Laughing on the Outside (Crying on the Inside"). Y. 5993.

INK SPOTS, Vocal with Instrumental Acc.—"The Gypsy," and "Everyone is Saying Hello Again" (Why must we say good-bye). T. 5994.

PARLOPHONE

GERALDO AND HIS ORCHESTRA—"Prisoners of Love," and "I'll Dance at Your Wedding." A. 7572.

THE ORGAN, THE DANCE BAND AND ME—"Primrose Hill," and "You Always Hurt the One you Love." A. 7573.

TEDDY WILSON QUARTET—"Blue Mood" (Pt. 1) and (Pt. 2)—Teddy Wilson (Pno.); Harry James (Tpt.); "Red" Norvo (Xyl.); John Simmons (Bass.). A. 7575.

DOROTHY SQUIRES, Vocal with Orchestra—"Safe in My Arms Again," and "I'd Like to get you Alone." A.7574.

H.M.V.

VAUGHAN MONROE AND HIS ORCHESTRA—"Love on a Greyhound Bus," and "All the Time." EA. 3440.

TEX BENEKE, WITH THE MILLER ORCHESTRA—"Hey Ba-ba-re-bop," and "Texas Tex." EA. 3441.

SPIKE JONES AND HIS WACKY WAKAKIANS—"Hawaiian War Chant," and "That Old Black Magic." EA. 3442.

DINAH SHORE, with Orchestra—"Remember," and "Blue Skies." EA. 3443.

TONY PASTOR AND HIS ORCHESTRA—"Five Salted Peanuts," and "Autumn Serenade." EA. 3433.

JOE LOSS AND HIS ORCHESTRA—"Soft Shoe Shuffle," and "Bugle Bounce." EA. 3434.

TOMMY DORSEY AND HIS ORCHESTRA—"Bill" and "Ol' Man River." EA. 3444.

FREDDY MARTIN AND HIS ORCHESTRA—"You're the Cause of it all," and "I love an old-fashioned Song." EA. 3435.

TOMMY DORSEY AND HIS ORCHESTRA—"Where Did You Learn to Love," and "If I had a Wishing Ring." EA. 3436.

PERRY COMO AND THE SATISFYERS—"Blue Skies" and "I'm Always Chasing Rainbows." EA. 3437.

BUNK JOHNSON AND HIS NEW ORLEANS BAND—One "Sweet Letter From You," and "I Wish I Could Shimmy Like My SISTER KATE"—Bunk Johnson (Cnt.); Jim Robinson (Tmb.); George Lewis (Clt.); Alcide Pavogeau (Bass.); Lawrence Marrero (Bjo.); Baby Dodds (Dms.); Alton Purnell (Pno.). EA. 3438.

COLUMBIA

VICTOR SILVESTER AND HIS BALLROOM ORCHESTRA—"Love is a Merry-go-round," and "Let it be soon." DO. 2949.

KATE SMITH, WITH ORCHESTRA—"Pretending," and "If I Had a Wishing Ring." DO. 2950.

NELSON EDDY, WITH ORCHESTRA—"THE WHALE WHO WANTED TO SING AT THE MET. Pts. 1/8, DO. 2938/40.

DANNY KAYE WITH ORCHESTRA—"Minnie the Moocher," and "Dinah." DO. 2941.

CARROLL GIBBONS AND THE SAVOY HOTEL ORPHEANS—"It's a Beautiful Day," and "To Bed Early." DO. 2943.

VICTOR SILVESTER AND HIS BALLROOM ORCHESTRA.—"Silver Shadows, Golden Dreams" and "Dancing With You." DO. 2944.

FRANK SINATRA, Vocal with Orchestra—"Someone to Watch Over Me," and "Embraceable You." DO. 2945.

CLEMENT Q. WILLIAMS—Baritone, with Piano Acc., by Enid Conley—"Some Distant Day," and "Mary Magdalene." DO. 2946.

"Until the Day I Die," and "Covent Garden." DO. 2947.

AUSTRALIAN ABORIGINAL SONGS, Pt. 1—(a) Jabbin, Jabbin; (b) Bangee Rang an-an-ah.

AUSTRALIAN ABORIGINAL SONGS, Pt. 2—(a) The Bingo Corroborees (Bingo Bingo); (b) Maranoa Lullaby; (c) Warrego Lament. DO. 2948.

PHILHARMONIC CHAMBER ORCHESTRA, Conducted by Walter Susskind — Italian Serenade." DOX. 808.

KATHLEEN FERRIER, Contralto, Piano acc. by Gerald Moore—"Spring is Coming," and "Come to me Soothing Sleep." DOX. 809.

SANDY MACPHERSON at the BBC Organ—"The Oak and the Rose." DO. 2897.

USING THE 807 VALVE IN RECEIVERS

(Continued from Page 31)

under class AB1 conditions signifies that no grid current flows, so that any type signal input circuit can be employed, including resistance coupling. The signal voltage requirements are not difficult and it is naturally of great advantage to obtain upwards of 40 watts audio power with nothing more than a phase invertor or phase splitter stage to supply the grid signal voltage.

Use of transformer input confers a slight advantage, in that distortion does not begin so sharply at grid current or overload point. This is a consideration in modulator design, where ability to handle signal peaks, or the need for the last ounce of power, is often more important than any minor limitation on frequency response imposed by a mediocre transformer.

As previously mentioned, it is most important to stabilise the screen voltage as far as possible, either by providing it from a separate power supply or by obtaining it from a heavy bleed circuit—the heavier the better. If this is not done the screen voltage will drop on sustained loud passages and limit the power output drastically. Where there is any doubt about the adequacy of the bleed circuit the screen can be heavily bypassed to earth—say with 32mfd—the condenser serving at least to maintain the screen voltage during sharp signal peaks as normally occur in speech.

Operated under class AB2 conditions, with fixed bias and well regulated plate and screen supplies, a pair of 807 valves will deliver up to 120 watts of audio, with a nominal grid input power of 0.2 watt. Plenty of care is necessary in designing an audio amplifier of this power rating, but the finished job would be relatively simple by comparison with other valve equipments, and yet ample to meet the need of almost any public address installation or amateur station.

The operation and ratings of the 807 as an RF power amplifier are fairly well known to amateurs and have received no little attention in past issues. A single 807 will handle efficiently all the power which it permitted under a class B licence, while two of them in push-pull are more than adequate for the needs of class A licensees.

In view of the present price reduction it is hard to visualise a simpler or less expensive transmitter than the one described last month—one valve operating as oscillator and doubler driving an 807 to full power if necessary.

RADAR SAFEGUARDS SHIPPING

(Continued from Page 5)

is in keeping with the march of progress that this new safeguard—entirely British in its conception and development—should be a standard fitting on the finest passenger liner afloat. The work of equipment was entrusted to the Cossor Company who have done much valuable research work in the field of radar.

The radar equipment of the "Queen Elizabeth" comprises four units in all. There is the indicator, which embodies the display screen and all controls, and which is housed in a special radar room in the wheel-house; the main rack comprising the transmitter and receiver operating on 3 cms. wavelength; the alternator which is installed in the engine room; and, lastly, the scanner, which weighs some 150lb.

The scanner is the most interesting of the units in general appearance. It consists of a long curved reflector of true parabolic formation and substantial construction to withstand severe weather conditions, for it is situated high up above the wheelhouse. The reflector portion is made of special aluminium alloy as used for flying-boat hulls and is resistant to sea water. The range of the scanning beam covers from about 50 yards up to 12 miles.

The whole apparatus embodies the latest technique based on intensive research and experiment and it is the prototype of a compact standardised equipment readily adaptable for general use in all classes of mercantile vessels and capable of operation by any officer without special training.

By overcoming the seaman's greatest danger—fog—Britain has rendered a service to humanity that will be appreciated by all men of all nations who go to sea in ships.

ANSWERS TO CORRESPONDENTS

UNDER THE PERSONAL SUPERVISION OF THE TECHNICAL EDITOR

B.L. (Nth. Brighton, Vic.) sends his subscription to "Radio & Hobbies" and says he finds much in it of interest.

A. Many thanks for your subscription, B.L., and we are glad to note that you find our magazine so helpful.

R.R. (Vaucluse, NSW) suggests that we should publish a complete design of an elaborate receiver conforming to a rather lengthy list of specifications.

Many thanks R.R., for your letter, which was read with interest. While we agree that there would be a few readers who would be interested in just such a set, we are dubious about the idea of trying to combine everything in one very large set. Our own experience has shown that if one wants to cover several requirements it is better to have two or more less elaborate receivers, one for the enthusiast's own requirements and the other to suit the needs of the household. Nevertheless, the big new Amateur receiver which has been described should interest you. Many of your suggestions will be found in it, together with a few extra ones. We have never checked the use of a 6J8-G in the "Babygram" type of receiver, but understand that results are not as predictable as with the 6F7, owing to the coupling within the valve. There is no objection to using a 5Y3-G in this set and you should not have any difficulty in obtaining a voltage divider.

"Reader" (Norman Park, Qld.) sends in the circuit of a one-valve set using a 6V6GT without plate voltage.

A. Thanks for your letter and for the enclosed circuit. Connected in the way you show, the valve would be used as a diode rectifier so that the set would function essentially as a crystal set. It is doubtful whether the sensitivity would be higher or lower than with a crystal rectifier. To get the full benefit from a one-valve circuit it is absolutely essential to use the valve as an amplifier and provide a reaction circuit.

D.C. (Chesterfields, Vic.) reports having built up the "1Q5-TWO" receiver, and although we were dubious of the results which might be obtained in his rather remote location, says that 10 stations are received at good strength with a moderate outside aerial.

A. Thanks for your report on this set, and we are pleased to note that it is going so well. You could arrange it to tune the short-wave stations quite simply by replacing the commercial Reinartz coil with home-wound plug-in types. Data for this purpose is available through the shilling query service.

D.G.S. (Torwood, Qld.) reports on some experiments with a cathode loaded detector in an earlier issue of "Radio & Hobbies."

A. Many thanks for your letter which was read with interest. We have not had any occasion since to do any work with the detector and therefore cannot comment in the light of practical experience with it.

E.V.S. (West Coburg, Vic.) renews his subscription and reports enthusiastically about results with the universal tone control stage.

A. Thanks for your subscription and for the report on the tone control. It certainly can make an enormous difference to reproduction. We note your suggestion about the circuit diagrams but doubt whether such a scheme is really necessary.

J.S. (Ivanhoe, NSW) has built up a wind charger, but finds that it produces noise in the radio receiver.

A. Your trouble is apparently ordinary interference, due to sparking at the generator brushes. See that the commutator is smooth and clean and that the brushes are seating properly. Then try connecting a 0.1 mfd condenser from each brush to the frame of the generator, earthing this immediately beneath the generator tower. At the worst, you may have to instal a choke coil in series with each generator lead. Wind 50 or 100 turns of 24-gauge wire, or heavier, around a 1in. diameter former and try the effect of bypass condensers on either side or both sides of the choke.

J. D. (West Footscray, Vic.) is interested in amplifiers and asks a couple of questions about them.

A. No wiring diagram or parts list was prepared for the 10-watt amplifier described in the October, 1945, issue. Sorry, we cannot assist you in this direction. We note your suggestions regarding a description of public address equipment and may be in a position to do something along this line later. The same goes for the articles on pick-up mounting, &c. We have no immediate plans to run a full-scale review of swing records.

F.B. (Kallista, Vic.) says he thinks we made a mistake with the diode connections in the "Vibra-Five" receiver.

A. No, F.B., there is no error in the wiring to the 1K7 socket. The diode adjacent to the positive filament pin is used as the AVC diode so that a total of 4 volts delay operates on the AVC system. The diode at the negative end of the filament returns to filament minus, so that there is no delay on the rectifying action and the valve operates in the way it should.

THE following reprints are available on application at our offices, 60-70 Elizabeth-street, Sydney. They will be sent, post free, on receipt of stamps or postal notes.

How to Build a Synchronous Clock.
4 Pages ... 1/-

A Pendulum Type Electric Clock.
8 Pages ... 1/-

Build Your Own Windcharger.
8 Pages ... 1/-

Coil Details for Small Receivers.
1 Page ... 6d

Radio Circuit Symbols.
1 Page ... 6d

Collecting Verification Cards.
1 Page ... 6d

D.G.B. (North Bondi, NSW) renews his subscription to "R. & H." and asks about extending the frequency range of the FS6 transceiver.

A. Thanks for the renewal of your sub. The frequency range of the FS6 receiver can be extended by locating and removing the present aerial and oscillator coils and installing sockets for plug-in coils. You could then wind plug-in coils for the additional frequencies but we cannot supply specifications especially for the purpose. It would be rather problematical whether the receiver could be made to operate very well on 30 megacycles owing to the limitation of the 1C7-G converter. We have never experimented with the transmitter portion of this set.

W.J.R. (Wagga, NSW) is interested in the "R. & H." auto receiver, but is in difficulty about obtaining the chassis and steel cabinet.

A. This set was described at a time when chassis and cabinets were completely "out" and no arrangements were made to standardise on a layout or to provide a blueprint. We had reports from many readers who have built the set, and all have followed the plan of drawing up a layout to suit their own car and the parts on hand. If you draw up an accurate full-size chassis plan on drawing paper—or even brown paper—most large supply houses can have it made up for you. The same applies for the cabinet. We may describe another auto set one of these days but we cannot indicate just now when this may be.

K. E. McC. (Boort, Vic.) reports on the one-valve set using the 1Q5-GT. He says:—"I noticed that someone was asking about the range of the 1-valver with 9v H.T. I recently constructed one in Canberra and was able to receive 5AD and 2UW at good strength plus a few others I didn't identify. I could receive the locals with H.T. of 1½v. Aerial was about 25ft, going to about 15 above my window. I built it to be as compact as possible so as to put it in my drawer at work to listen to the Test cricket."

A. Thanks for the report on the set. You have certainly done well with it. Thanks for the subscription renewal. No, we have not described any ac-dc sets. The actual percentage of readers interested is quite small and we do not like the danger element associated with the construction of ac-dc or d-c apparatus by inexperienced enthusiasts.

D.S.O. (Lindfield, NSW) is much impressed with the performance of the "TRF Quality Six" and suggests that we describe another big TRF set like the "TRF Fidelity Nine" but using morden components.

A. The "TRF Fidelity Nine" can be built up with modern components, but we agree that a new description might be welcomed. We are not so happy about your alternative suggestion of a battery/mains operated portable. The sets are a problem technically and mains operation is hardly ideal for the rather frail 1.4 volt valves.

R.N.K. (St. Kilda, Vic.) is anxious to construct a canvas canoe, and asks us for plans.

A. Sorry that we cannot supply any plans, except those published in the February issue, which you will naturally have seen.

Many thanks for your encouraging remarks in regard to "Radio & Hobbies."

Unsigned (St. Peters, SA) sends in details or a two-stage receiver using an aerial wound around a cigar box case.

A. Thanks for the circuit, but it so happens that we have just described a little set which is basically similar to your own. However, we have avoided using the 1D8-GT, which is in very short supply and likely to remain so for quite a while to come.

D.G. (Stanmore, NSW) sends in his ideas relative to the design of a short-wave receiver.

A. Many thanks for your letter which was read with interest. Glad to note that you enjoy reading "Radio & Hobbies" but we cannot promise to follow your request relating to the front cover illustrations. The half-yearly index was omitted deliberately in the September issue but, if space permits, we will include a full year's index in this issue.

HOW TO SUBMIT YOUR QUERY

1. Queries will be answered in rotation through the columns of our magazine if not accompanied by a fee for a postal reply.

2. Queries, neatly and concisely set out, will be answered by mail as quickly as possible if accompanied by 1/- in postal notes or postage stamps. Endorse envelope "Query."

3. Back numbers are rarely available but reprints of most circuits, wiring diagrams, and parts lists will be supplied for 6d each, minimum charge 1/-. Thus a circuit, layout, and parts list will cost 1/6 in stamps or a postal note. Endorse envelope "Circuit."

4. Blueprints of exact size chassis layouts with all essential holes and cut-outs will be supplied if available for 2/6. Endorse envelope "Blueprint."

Address your letters to the Technical Editor, "Radio & Hobbies," Box 2728C, GPO, Sydney.

"VK3" (Melbourne, Vic.) sends in for comment the circuit of a two-stage grid modulated transmitter.

A. We doubt whether the transmitter would be officially acceptable in the light of the present regulations. They expressly state that transmitters must employ crystal control on all the lower frequency bands, or an oscillator of comparable stability. Modulating the grid circuit coupled to the oscillator plate might also cause frequency modulation of the oscillator. The efficiency of the grid-modulated 45 final would also be rather poor. No, we are not very keen on the circuit in the light of present practice and requirements.

H.M.T. (Camp Hill, Qld.) says he has converted a DC multi-meter to AC-DC, but finds that the AC ranges respond hardly at all.

A. The fact that your meter performs perfectly on DC would suggest that the instrument shunts and multipliers are all in order, so that any query must be centred on the switch and rectifier. You have apparently tried another rectifier and we can only suggest that for some reason or other you are being misled by the method of color coding or branding. We have actually come across a meter rectifier which was wrongly color coded and gave results similar to those you mention. Re-wiring the rectifier in line with markings on the bakelite case, however, overcame the difficulty altogether.

N.J.M. (Kensington Park, SA) asks a number of questions relating to our "1946 Standard."

A. The answers to your questions are as follow:—(1) Chassis for "Radio & Hobbies" receivers are usually available from radio supply houses for a period of several years after the descriptive article appears in print. (2) We plan to make available blueprints for all future chassis designs and these also should be available for several years or until they are obviously out of date. (3) The five-pin socket specified for the "Standard" receiver is used for the speaker plug. (4) There was apparently some confusion in the advertisement you mention, since the "1946 Standard" is definitely a 7-valve set. (5) It is quite in order to use metal valves in place of the equivalent glass types. (6) Nearest metal equivalent to the 6U7G is the 6K7 but, to the best of our knowledge, there is no metal type 6J8 or 6G8. Generally speaking there is no marked difference in the efficiency of metal or glass valves of comparable characteristics. (7) Provided the multi-meter is switched to the correct AC range there is no danger of burning out the meter when reading the voltage from a power transformer. There is, however, no method of measuring directly the current rating of the power transformer.

A.B. (Mackay, Qld.) writes in some length to tell us his ideas about the ideal amateur short-wave receiver.

A. We read your letter with considerable interest, A.B. and it certainly contains quite a few good ideas. However, as you observe, a set incorporating all the features you suggest would be a very involved and expensive one and not likely to be constructed by more than a few amateurs. We may ultimately describe a set along these lines, but so much time would be involved that no immediate promise can be made. The simple truth is that there is no such thing as an ideal amateur receiver, since the word must take into consideration factors of cost and complexity. We can only hope to describe, ultimately, a typical range of receivers which will meet the individual requirements of most amateurs. You are correct about the crystal earphones. The plate of the valve is fed through a resistive load and the signal fed to the earphones through a blocking condenser.

C. K. (Hendra, Qld.) writes in appreciation of "Radio & Hobbies" and says that he has built up successfully quite a large number of receivers and amplifiers.

A. Thanks for your letter and we are glad to note that you have had success with our circuits. A blue glow on the near surface of the glass envelope in a power valve or a rectifier is a purely incidental effect and actually indicates that the valve has a very high vacuum. It is strange, however, that it should appear and disappear in the way you mention and it is just possible that your amplifier becomes unstable at a very high frequency when a strong signal is fed through it. However, as the amplifier appears to behave normally at all times, it is doubtful whether the matter is worth worrying about especially if all operating voltages and currents remain normal.

N.D. (Bundamba, Qld.) says he has built up the "R. & H." Modulated Oscillator, but is at a loss to know how to calibrate it up to put it to use in the alignment of a receiver.

A. It would seem from what you say that the oscillator is functioning as it should be and it is quite conceivable that a modulated signal should be heard with the oscillator dial in more than one position, owing to harmonics. We regret that we cannot supply a pictorial diagram for this oscillator, as none was drawn up for it. An article on calibrating a modulated oscillator appeared in the January, 1944, issue, and this should assist you if you have the issue on hand or can borrow it from a friend. Sorry, but we cannot refer you to any similar article which deals exclusively with the use of an oscillator for aligning a receiver. Connected as a triode, the 6J7G could replace the 6C5 in most circuit applications. We note that you have the "1946 Advance" in operation, but it is certainly not correct to have to omit components in the way you mention. We rather feel that there must be an error in the wiring somewhere.

K.D.G. (Mornington, Vic.) sends in a contribution to the "Reader Built It" page.

A. Thanks for your contribution and your interest in "Radio & Hobbies." However, the circuit is a perfectly conventional one, and there would be no particular point in reprinting it at this stage.

J.D.H. (Cremorne, NSW) suggests that we should devote more space to news of short-wave stations, and also make a point of using better grade paper, even though this may mean an increase in price.

A. Many thanks for your letter, J.D.H., and for your complimentary remarks. Despite our increased size, we are still pushed for room in the magazine, and cannot see our way clear right now to increase the proportion of space devoted to short-wave news. We agree with the desirability of using a better grade of paper, but simply cannot do so at the moment, with the paper position as it is.

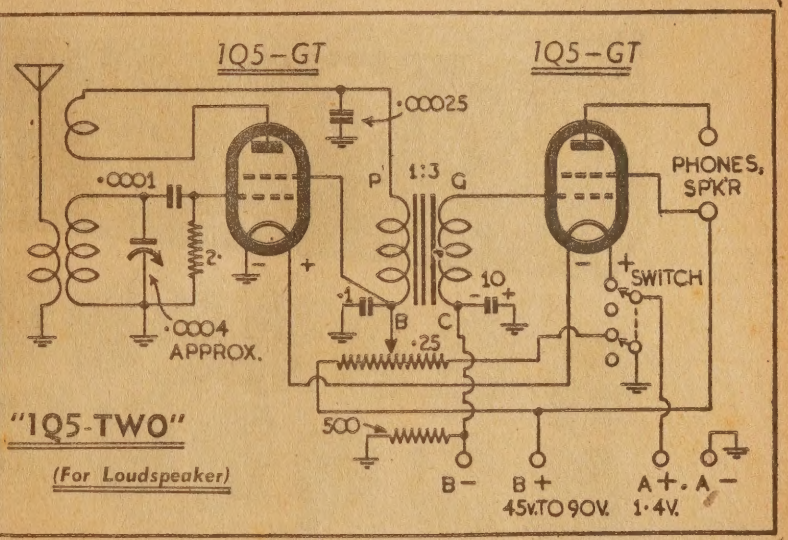
USING A SPEAKER WITH 1Q5-TWO

IN our mail over the past few weeks, there has been a predominance of letters about the 1Q5-TWO receiver. Despite the shortage of valves, hundreds of these little sets appear to have been built up with immediate success. The burden of the present mail concerns the modification of the circuit to allow operation with a loudspeaker.

The chief requirement is the application of a higher plate voltage to the output stage, since no tube can be expected to deliver substantial audio power with only a few volts on the plate. A plate voltage of from 45 to 90 volts is required and the ideal choice for the set is probably the new 67½ volt Minimax battery.

Application of this voltage to the plate and screen of the output valve necessitates some grid bias, and this is most easily provided from a back-bias network.

The 1Q5-TWO circuit has therefore been redrawn here to include provision for the higher plate voltage and the back bias. It will be noted that the original series arrangement of the filaments has been retained, but they can



be wired in parallel for 1.4 volt operation without essential change to the circuit values. The output valve bias is affected by the filament wiring, but not to the extent to render imperative any change to the resistor.

The application of the higher plate voltage to the detector necessitates a modification to the reaction control circuit, and in many cases the simple series potentiometer will be found inadequate. The difficulty is overcome in the modified circuit by supplying the screen also from the moving arm of the potentiometer and returning the low potential end of the potentiometer to chassis. This ensures that the plate and screen voltage can be reduced to zero, if need be.

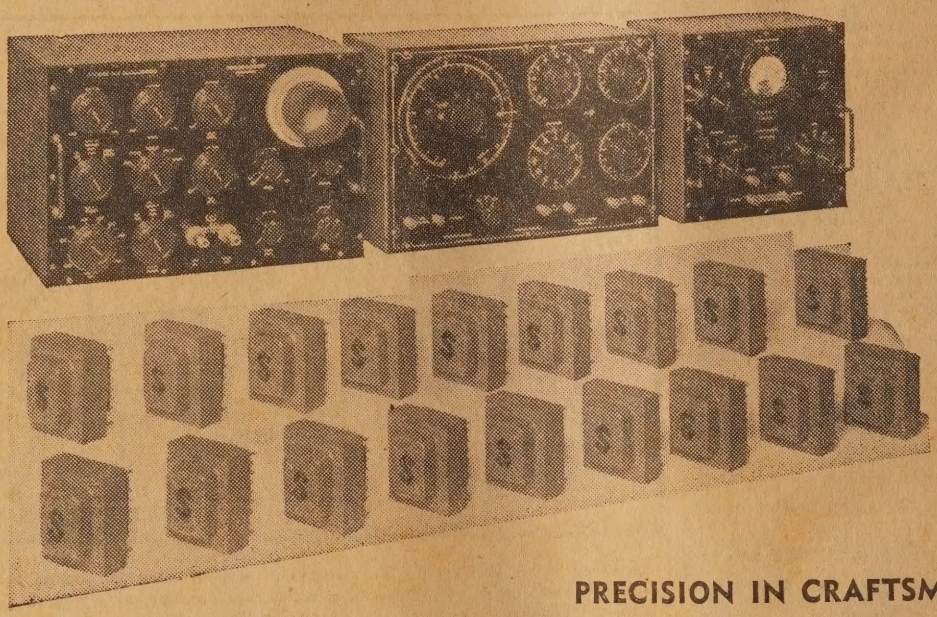
The drain of the potentiometer across the battery is of no consequence while the set is in operation, but it should not be allowed to continue during the many hours the set is not in use. The simple off-on switch originally specified should therefore be changed for a double pole type, as shown. One section is used to break the filament circuit, and the other to break the circuit through the potentiometer.

The mere changeover to the modified circuit is naturally no guarantee of good loudspeaker reception, since this can only be expected on such a small set in location where the signal strength is high. But if you can tune in stations with the original set at ample earphone strength there is a good chance of loudspeaker reception with the higher operating voltage.

RED LINE

TRANSFORMERS

PRECISION IN DESIGN



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